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JULY 10, 1920 VOL. VII. NO. 7

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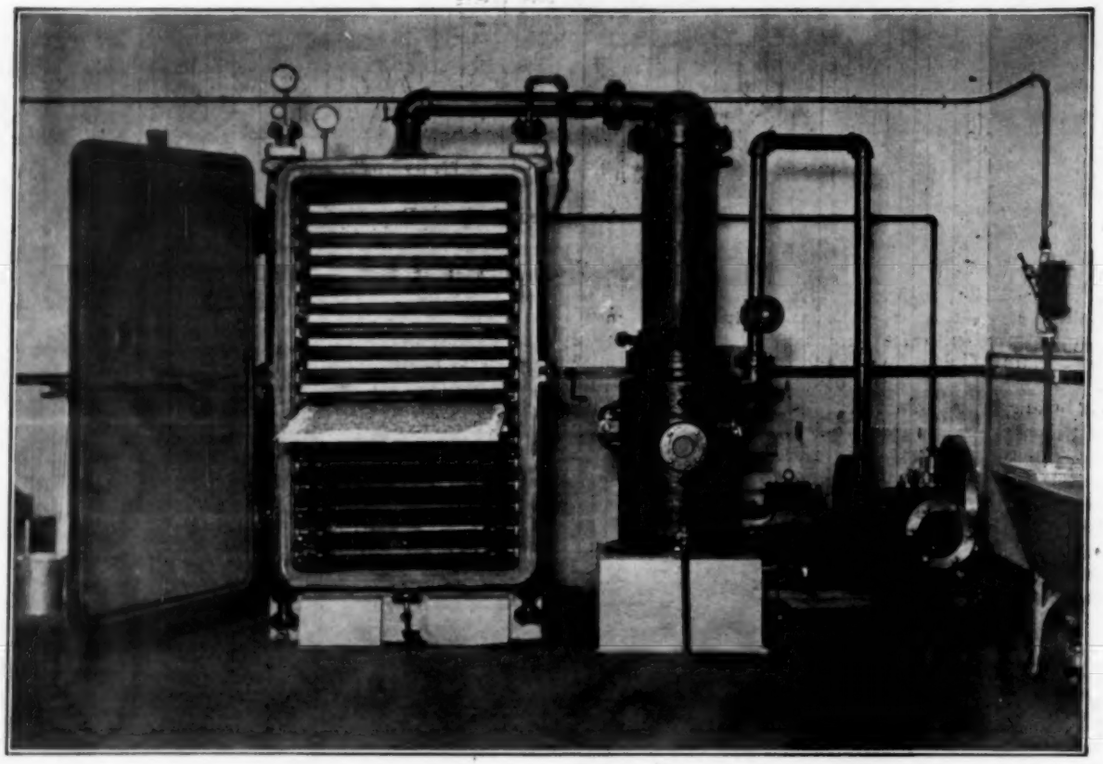

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THE RUBBER AGE AND TIRE NEWS

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Vol. VII JULY 10, 1920 No. 7

The Determination of Rubber Hydrocarbon in Raw and Vulcanized Rubber

By W. K. Lewis and W. H. McAdams

Department of Chemistry and Chemical Engineering, M. I. T., Cambridge, Mass.

In the fall of 1916 the writers noticed in the literature[1] a number of articles concerning analytical methods for the determination of rubber hydrocarbon in raw and vulcanized rubber, depending upon the bromine absorbed by rubber. A survey of these articles showed that several different types of bromination methods had been proposed, but the results appeared to be very discrepant. The most promising type seemed to be the one involving the addition of a known amount of bromine, dissolved in a suitable organic solvent, such as carbon tetrachloride, to a solution of the rubber in an organic solvent. After the solution had stood for a period of time the unabsorbed or excess bromine was determined by titration, usually by the addition of standard sodium thiosulphate in the presence of KI solution and starch paste.

Inasmuch as this paper will not deal with the structural formula of rubber, the conventional formula $(C_{10}H_{16})_n$ will be used to designate rubber hydrocarbon, with the understanding that this contains $2n$ double bonds. Two types of reaction are possible, involving in the first case, addition, and in the second, substitution, of bromine.

$$(C_{10}H_{16})_n + 2nBr_2 = (C_{10}H_{16}Br_4)_n \qquad (1)$$

$$(C_{10}H_{16})_n + nBr_2 = (C_{10}H_{15}Br)_n + nHBr \qquad (2)$$

In the second reaction it will be noted that *two* atoms of bromine are necessary to substitute *one* atom of hydrogen, thereby producing one formula weight of HBr. Some of the investigators found that substitution occurred, and tried to choose conditions such that substitution would be minimized or entirely prevented.

McIlhiney[1] has shown that in the bromination of unsaturated oils in an organic solvent the bromine not only adds to the double bonds as in Reaction 1 but a considerable amount is substitutes as in Reaction 2. Gill[2] states that rosin oil shows a very high substitution.

This paper deals with the application of the McIlhiney method, developed for unsaturated oils, to rubber hydrocarbon. Briefly, it consists in determining by a volumetric method the substitution which does occur under the particular conditions of the analysis in question, and deducting twice the observed substitution from the bromine consumed, which gives a measure of the true bromine addition, from which the rubber hydrocarbon is readily calculated.

Experimental Part—Raw Rubber

Preparation of Pure Rubber Hydrocarbon Solution—Plantation pale crepe was extracted overnight with acetone[3] in the standard extraction apparatus to remove the resins, then carefully dried, dissolved in pure carbon tetrachloride, and finally filtered to remove the proteins and other insoluble matter. The resulting solution of pure rubber hydrocarbon was analyzed by evaporation to determine the total solids present in a known volume, and this known rubber hydrocarbon content was used as a basis of comparison with the calculated figures found by bromine addition as described below.

Procedure

To a known volume of the above pure rubber hydrocarbon solution, containing approximately 0.2 g. $(C_{10}H_{16})_n$, a measured volume of bromine in pure carbon tetrachloride corresponding to approximately 150 per cent excess bromine above that necessary for addition was added, and the mixture was allowed to stand in glass-stoppered bottles for varying lengths of time in a dark closet at room temperature. After this exposure to bromination 10 cc. of a 3 per cent KI solution were added to take up the excess bromine and the resulting iodine was titrated by means of 0.25 *N* standard sodium thiosulphate, using starch paste as an indicator. In order to determine the substitution which had occurred, 10 cc. of 5 per cent KIO_3 were now added to convert the equivalent of the HBr into iodine, which was then titrated to a second endpoint. A blank was run under the same conditions as the rubber determination in order to determine the bromine added to the rubber analysis, and to eliminate any error caused by impurities in the reagents used. The sample calculation given below indicates the relation of the various readings.

Rubber taken = 0.2000 G. Thiosulfate Solution = 0.235 *N*
Equivalent Weight of Rubber of Hydrocarbon, $(C_{10}H_{16})_n$ = 34

	Cc. Thio.
For blank	70.00
Excess found by first titration	38.00
Consumed	32.00
Twice second titration, (2) (3,5)	7.00
True addition	25.00

$$\frac{25.00 \times 34 \times 0.235 \times 100}{0.2000 \times 1000} = 100 \text{ per cent theoretical addition}$$

Notes

In order to avoid loss of bromine vapor upon opening the bottle after the bromination period, the bottle was cooled by immersion for a few minutes in ice water, in the dark, and the KI solution was introduced by means of 1-in. rubber tubing attached to the neck of the bottle and extending up above the stopper.

The carbon tetrachloride was purified by subjecting it to the action of saturated chlorine water for several days in diffused daylight, followed by washing with water and drying

* Read before the Rubber Division at the St. Louis Meeting, American Chemical Society, April 12-16, 1920.

[1] *J. Am. Chem. Soc.*, 21 (1899), 1084.

[2] "Oil Analysis," 9th Ed. (Revised), p. 67.

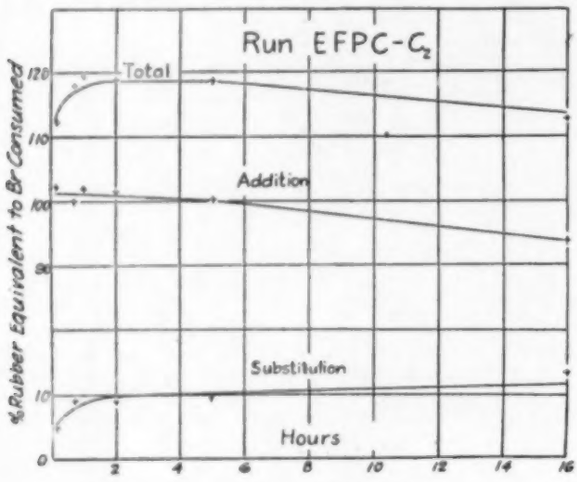
[3] The acetone was allowed to stand with Na_2CO_3 and $CaCl_2$ and the fractionally distilled.

with CaO, previous to a distillation in which the fraction boiling within 1°C. of the proper boiling point was taken.

Discussion of Results

The attached plot shows typical results[1] of runs on extracted, filtered pale crepe. It will be noticed that the substitution increased with the bromination time, but that the addition followed closely the theoretical 100 per cent line, when the time of exposure was 2 to 4 hrs. The substitution is doubtless a function of the conditions under which the experiment is conducted. For example, it is quite possible that a small amount of water present during the bromination would increase the substitution.

One possible objection to this method is that substitution might continue after the addition of the KI solution. It will be noted that after this time no halogen except iodine is



RESULTS OF RUNS ON PALE CREPE

present in the solution, and iodine is known to be much less apt to substitute hydrogen than bromine. Furthermore, if iodine substitution during titration took place before the first end-point no error whatever would be introduced; the effect would be the same as if bromine had been substituted, as the HI so formed would be determined in the second titration and hence an automatic correction would be introduced for this action. However, if iodine substitution took place after the first end-point (by the substitution of iodine produced by the action of KIO_3 on the HI already present) the second titration would be high and the calculated addition would be low, because the addition is obtained by subtracting twice the second titration from the bromine consumed in the first. Furthermore, if at any time HBr splits off from the brominated molecule and this action is not accompanied by further addition, the calculated addition would be low. The results as shown in the attached plot indicate that if such undesirable actions occurred they were negligible in effect.

Vulcanized Rubber

The above results have shown the method to be satisfactory for raw rubber; it remained for Sackett and Seltzer[2] to adapt it to vulcanized rubber. Since carbon tetrachloride will not "dissolve" vulcanized rubber, a new "solvent" had to be obtained, and the choice was tetrachlorethane.

In addition to the rubber hydrocarbon, resins, and proteins present in raw rubber, vulcanized rubber may contain fillers and compounding materials, such as mineral oxides or salts, carbon, mineral rubber, organic accelerators, vulcanized oils (factice), free sulphur, and sulphur combined as polyprene disulphide $(C_{10}H_{16}S_2)_n$.

The acetone extraction of the finely cut sample was made to remove not only resins but also free sulphur and other acetone-soluble materials. The rubber residue was dissolved by refluxing with tetrachlorethane[3] for several hours, diluted to a definite volume with carbon tetrachloride, and allowed to settle, then an aliquot part was pipetted out for bromination as in Brandegee's method. The finely divided fillers were excluded from the aliquot part so taken by placing a wad of cotton in the tip of the pipette, and applying a gentle suction. By this means the troublesome centrifuging procedure for eliminating solid material was avoided.

During the course of the experimental work Sackett and Seltzer found that substitution could be reduced practically to zero by titrating the brominated sample in very dim daylight, thus eliminating a difficulty previously met by them in an unstable end-point during the second titration. When the per cent excess bromine above that necessary for addition was small (50 per cent) the results were low; 100 to 150 per cent excess bromine gave the best results.

Combined Sulphur Procedure

The combined sulphur was found by evaporating to dryness in a porcelain casserole an aliquot part of the tetrachlorethane solution free from insoluble matter, and determining the sulphur by the method of Davies[4]. This consisted in adding 10 cc. of saturated arsenic acid solution, 10 cc. of fuming nitric acid, and 3 cc. of bromine water, and evaporating to a sirupy consistency. (If all the organic matter is not destroyed, more fuming nitric acid is added, and the mixture again evaporated to a syrupy consistency.) After the addition of a few crystals of potassium chlorate, the solution is evaporated to dryness, heated to boiling with 50 cc. of 10 per cent hydrochloric acid solution, filtered through paper, and diluted to 300 cc. with distilled water in a beaker. The sulphuric acid is precipitated as barium sulphate by the addition of barium chloride, and determined gravimetrically in the usual manner.

Calculation of Total Rubber Hydrocarbon

The rubber hydrocarbon combined with the sulphur thus found is calculated by multiplying the percentage of sulphur by $\frac{C_{10}H_{16}}{S_2}$, or $\frac{136}{64} = 2.13$.

The total rubber hydrocarbon is calculated by adding the rubber hydrocarbon combined with the sulphur and the uncombined rubber hydrocarbon found from the bromine addition.

Procedure for Vulcanized Rubber

Extract a weighed sample (approximately 1.5 to 2.0 g.) of vulcanized rubber with acetone for 8 hrs. in the standard extraction apparatus, evaporating the acetone to obtain the percentage of acetone-soluble material[5]. Aspirate CO_2 through the rubber to remove the traces of acetone, reflux 4 hrs. with approximately 100 cc. of tetrachlorethane, cool, and make up to mark in a 250 cc. calibrated flask with carbon tetrachloride. Remove a 25 cc. alquot portion by applying gentle suction to a pipette containing a small piece of cotton in its tip. Place this sample in a glass-stoppered bottle of 250 to 500 cc. capacity, add from a burette a measured amount of bromine in carbon tetrachloride corresponding to at least 100 per cent excess bromine above that necessary for the addition reaction, insert the stopper tightly, and allow to stand for 3 hrs. in a dark closet. At the end of this time, darken the room, add 10 cc. of 10 per cent KI solution, shake, and titrate rapidly with 0.1 *N* standard sodium thiosulphate using starch paste as an indicator. As soon as the first end-point has been noted, add 10 cc. of 1 per cent KIO_3 solution, and titrate rapidly to the second end-point with thiosulphate. The titration of a blank run under similar conditions gives the thiosulphate equivalent to the bromine added.

The method of calculation of the results is entirely similar to that used in the case of raw rubber, except that to get total rubber the rubber equivalent to combined sulphur is added to that determined by bromination.

[1] Brandegee, 1917. Thesis submitted in partial fulfillment of the requirements for the S.B. degress at the Massachusetts Institute of Technology.

[2] Sackett and Seltzer, 1918. Thesis submitted in partial fulfillment of the requirements for the S.B. degree at the Massachusetts Institute of Technology.

[3] This solvent was purified in the same manner as the carbon tetrachloride.

[4] *Chemist Analyst*, 15 (1915, 4.

[5] In case "factice" (vulcanized oil) is present, it should be removed by treatment in the usual manner by extraction with alcoholic potash. This treatment was unnecessary for the samples used.

TABLE I—RUBBER HYDROCARBON BY ADDITION

Sample	Individual Runs Per Cent				Average Per Cent
A	86.2	86.6	86.2	83.8	85.5
B	63.5	66.5	...	...	65.0
C	56.6	52.6	52.7	50.7	53.2
D	54.2	55.0	53.5	55.0	54.4
E	45.4	45.2	...	...	45.3
F	80.5	81.9	74.9	74.7	78.0

The final analyses are summarized in Table II.

TABLE II

Sample	Acetone Extract Per cent	Nature of Compounding Material	Combined Sulphur Per cent	Rubber Equivalent of Combined Sulphur Per cent	Uncombined Rubber (by Bromination) Per cent	Total Rubber (by Analysis) Per cent	Total Rubber Known Composition Per cent	Error in Total Rubber Hydrocarbon Per cent
A	3.46	None	3.4	7.2	85.5	92.7	93.7	—1.05
B	1.90	Litharge	3.1	6.6	65.0	71.6	75	—3.4
C	2.33	Zinc oxide	3.3	7.0	53.2	60.2	60	+0.2
D	2.33	Sublimed lead	1.6	3.5	54.4	57.9	60	—2.1
E	...	Zinc Oxide and organic accelerator	1.1	2.4	45.3	47.7	48	—0.4
F	...	Mineral rubber and accelerator	2.16	4.6	78.0	82.6	80.5	+2.1

Table II compares the percentages of total rubber hydrocarbon as found by analysis with the known figures for rubber content supplied by the compounders of the samples. In no case did the analyst have any information as to the composition of the samples. The analytical figures average low, as they should do because of the resin and protein content of the raw rubber. The analytical results are, however, probably high for true rubber hydrocarbon, because any sulphur combining with resin, protein, or accelerator to give a product insoluble in acetone but soluble in tetrachlorethane is figured over to its equivalent of rubber, and, further, any sulphur substituting in rubber hydrocarbon itself will increase the results. These factors are probably negligible, except for sulphur combined with artificial accelerators. Any unsaturated organic material insoluble in acetone but dissolved by tetrachlorethane will also increase the analytical results. This is probably a cause of the high figures in the presence of mineral rubber. Few compounding materials are sufficiently unsaturated, however, to be serious in this regard.

It is believed that this procedure is by far the simplest and most accurate direct estimation of the rubber content of vulcanized articles. It should prove especially useful in the evaluation of shoddies, because it shows the extent to which the unsaturation of the rubber has disappeared, due to previous vulcanizations.

Within the experimental error, the results prove that rubber hydrocarbon is unsaturated to an amount equivalent to four atoms of bromide for each $C_{10}H_{16}$, and further that "combined" sulphur reduces this unsaturation by two bromine atoms for each sulphur combined. These facts seem incompatible with any theory other than that the sulphur taken up by rubber on vulcanization is chemically combined.

Summary

Working with a filtered carbon tetrachloride solution of acetone-extracted plantation pale crepe, it has been shown by a volumetric method involving a double titration that the bromine consumption, corrected for the observed substitution, is a true measure of the actual amount of pure rubber hydrocarbon known to be present. Although the amount of substitution increases with the length of the bromination period, the addition corresponds quantitatively to the actual amount of pure rubber hydrocarbon present, when the bromination time is from 2 to 4 hrs.

II.—Experimental data are given to show that the actual per cent of $(C_{10}H_{16})_n$ in vulcanized soft rubber can be determined by a volumetric bromination method herein described, involving a second titration to correct for the substitution which accompanies the particular analysis; by titrating in dim daylight, this substitution correction can be made very small.

III—Tetrachlorethane is a suitable "solvent" for the soft vulcanized rubber goods used.

IV—Experimental data shows that the so-called "combined sulphur" in soft vulcanized rubber is actually combined with the double bonds of the rubber hydrocarbon.

The writers desire to express their appreciation of the cooperation of the Chemical Department of the Goodyear Tire & Rubber Company, in preparing samples of known rubber content, and their indebtedness to Messrs. Brandegee, Sackett and Seltzer for developing the analytical procedures and making most of the analyses.

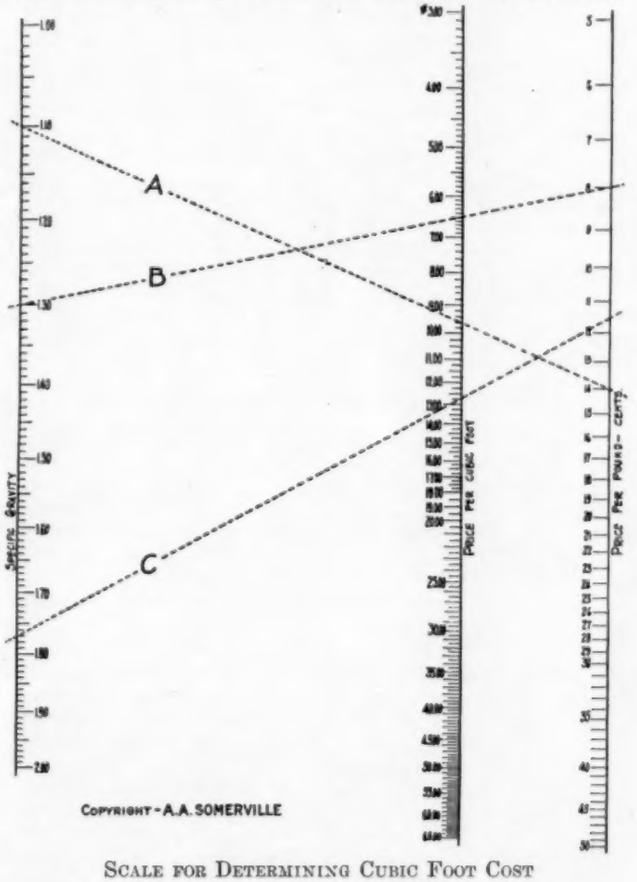
Determining Cubic Foot Cost

A direct method for the easy determination of the cubic foot cost of a rubber compound, designed and copyrighted by Dr. A. A. Somerville, is being distributed to laboratory compound and technical men by the R. T. Vanderbilt Co., of New York.

It is in the form of a card 8x10 inches containing three mathematical scales covering a complete range of practical possibilities at this time: i. e., a "specific gravity" scale ranging from 1.00 to 2.00 a "cost per pound" scale ranging from 5 to 50 cents, and a "cubic foot cost" scale covering any resulting combination of the other two scales.

The method of use consists in simply laying a straight edge on the diagram intersecting the "specific gravity" and "cost per pound" scales at the proper points and reading the "cubic foot cost" at the intersection of that scale.

As illustrations, three examples of the method of determination of the price per cubic foot are shown in the accompanying cut of the chart. Line A is for material of S. G. 1.10 and cost of 14 cents per pound. The intersection of this line with the middle scale gives a price of $9.60 per cubic foot. Similarly line B is for material of S. G. 1.30 and 8 cents per pound with a cost of $6.50 per cubic foot. Line C gives a cost of $12.80 per cubic foot for material of S. G. 1.77 costing 11.5 cents per pound.



SCALE FOR DETERMINING CUBIC FOOT COST

The scales are quite accurate and were determined in detail by Russell H. Hughes, an engineer with the American Telegraph and Telephone Company.

A New Process of Vulcanization *

By S. J. Peachey, M. Sc. Tech. F.I.C.

The vulcanization of rubber, by which term is understood the chemical transformation of the raw rubber into a modified rubber, possessing greater stability and improved mechanical and physical properties, is effected at the present time by one of two methods, viz., the hot cure, which is extensively employed in the production of the great majority of rubber goods, and the cold cure, which finds application mainly in the manufacture of thin sheet rubber goods, dipped articles and rubber proofed fabrics.

The first method consists in mixing the rubber intimately with a certain proportion of sulphur, and heating the "compound" to a temperature of 130 to 150 degrees C. for a period of time which varies with the amount of sulphur employed, and averages perhaps one to three hours. Under these conditions reaction takes place between the rubber and the intermixed liquid sulphur, with the formation of additive products which possess properties quite distinct from those of raw rubber. The lower addition products, containing from two to five per cent of combined sulphur, are soft, pliable, and highly distensible, while the higher ones, containing say from 20 to 32 per cent of combined sulphur are hard, tough and non-distensible. These two stages in the sulphurization of rubber are represented in the industry by the soft rubbers and the ebonites.

The second process was discovered by Parkes. Its application in the industry is limited by the fact that it produces a mere surface vulcanization, and can therefore be employed only for thin rubber sheets or surfaces. The rubber or rubber-coated fabric is treated with a dilute (3 to 4 per cent) solution of sulphur monochloride in carbon bisulphide, when vulcanization rapidly occurs at the ordinary temperature, the resulting material possessing to a considerable degree the properties of rubber vulcanized by the hot process.

From the time of Parkes' discovery of the sulphur-chloride process in 1846—three-quarters of a century ago—nothing in the nature of a chemically new method of vulcanization had been brought forward until the year 1918, when the process forming the subject matter of British Patent No. 129826 was discovered by the writer, as the result of an investigation on the behavior of rubber towards the various allotropic forms of sulphur.

The New Process

Briefly the new process consists in exposing rubber, alone or in admixture with practically any useful filling agent or pigment, successively to the action of two gases, viz., sulphur dioxide and hydrogen sulphide. The gases diffuse into the rubber and there interacting produce a particularly active form of sulphur, which is capable of combining with and vulcanizing the rubber, even at the ordinary temperature. The reaction resumably takes place according to the equation:—

$$2H_2S + SO_2 = 2H_2O + 3S$$

Unlike the Parkes process, which yields an addition product containing both sulphur and chlorine, the new process leads to the formation, without the aid of heat, of a sulphur addition product, comparable in every way with that produced by the hot vulcanization process.

The process is applicable not only to rubber in its ordinary form, that is to say, as an elastic or plastic solid, but also to dissolved rubber. The treatment of a rubber solution alternately with the two gases mentioned above brings about complete pectization of the solution to a jelly consisting of vulcanized rubber distributed through the solvent. On expelling the latter by evaporation a fully vulcanized rubber of excellent quality is obtained.

The latter process may be controlled exactly to yield a rubber possessing any desired degree of vulcanization. For this purpose a solution of rubber in benzene of known concentration is saturated with hydrogen sulphide, and is then mixed with a definite quantity of a standard solution of sulphur dioxide in benzene, the amount being calculated in accordance with the equation given above, from which it is evident that one part by weight of sulphur dioxide reacting with excess of hydrogen sulphide will produce in the rubber one-and-a-half parts of active sulphur. Under normal conditions practically the whole of this sulphur combines with the rubber yielding a vulcanized product containing only a mere trace of free sulphur.

Rubber vulcanized in this manner so as to possess a vulcanization coefficient of about 2.5 exhibits remarkable strength and toughness, in spite of the fact that no mechanical pressure is employed at any stage of the process. The probable explanation of this is that the vulcanization being effected in the cold, it is neither preceded nor accompanied by depolymerization, with the result that the collodial molecules retain their original magnitude unchanged, yielding a product of maximum strength.

The investigation of the mechanical and physical properties of the vulcanized rubber obtained by the process is still incomplete, and publication of the results must therefore be deferred until a later date.

An Important Feature

An important feature of the new process is that it removes the limitations previously imposed on the manufacturer in his choice of coloring and filling agents. The number of colors which will withstand prolonged heating with sulphur at a temperature of 140 degrees C. is comparatively small, and include the well-known rubber pigments vermillion, antimony sulphide, zinc and chromium oxides, carbon black and perhaps half-a-dozen others. With few exceptions it has proved impracticable to employ coal tar dyestuffs—either as such or in the form of lakes—for the coloring of rubber, because the color of these is either destroyed or modified when exposed to the conditions obtaining during the hot vulcanization process. To a great extent the same remarks apply to the Parkes process, in that sulphide chloride is an exceedingly energetic reagent, and few colors will resist its action.

The new process, eliminating as it does the use of heat and of sulphur chloride, renders it possible to introduce into the rubber a large selection of coal tar dyestuffs and lakes, and even natural coloring matters such as chlorophyll, and to produce vulcanized rubbers possessing pure and delicate shades of color quite unobtainable under the old conditions. Further, organic filling agents, such as leather waste, sawdust, wood meal, and the like, which are decomposed or partly decomposed at the temperature employed in the hot vulcanization process, or by the action of sulphur chloride in Parkes' process, can be introduced by the new method into rubber mixings, yielding cheap fully vulcanized products possessing new properties and a high degree of durability. In this manner, for example, employing wood meal and a small proportion of rubber, it becomes possible to produce a new and very cheap class of material to replace linoleum and other floor coverings, with distinctly superior qualities as regards color, durability and flexibility. Similarly, by incorporating leather waste (buffings or shavings), with a comparatively small amount of rubber, and vulcanizing by the new process, it becomes a simple matter to manufacture a reformed leather closely resembling the real article in appearance and character, and possessing even greater durability. The process lends itself to the manufacture, not only of hard-wearing leathers suitable for boot and shoe manufacture, but also of delicately tinted and grained leathers for upholstery and artistic work. Further, by the application of the new solution process, the re-formed leather may be built up into any desired article, the seams united by vulcanization, and stitching and riveting wholly dispensed with.

In regard to cost, the new process compares very favorably with the existing processes, in that it dispenses with the use of steam and of mechanical pressure, and employs in the place of sulphur and suphur chloride two gases which can be prepared and manipulated on the large scale at a cheap rate.

* India Rubber Journal, London, England.

The Balance of Work*

By William D. Hemmerly

Thompson and Lichtner Co., Boston, Mass.

An increasingly important function of scientific management, but one for which very little concerning its development and application has so far been presented, is the balance of work.

In an industry managed according to scientific management principles, it is necessary to create a mechanism which will make it possible for the management to ascertain accurately, constantly and instantly the condition of the plant so far as work ahead is concerned.

The sales office should be advised as to available manufacturing capacity so that delivery promises may be more intelligently made and selling policies modified if necessary.

The employment department should be kept informed as to various classes of help available at all times so that proper steps may be taken to properly adjust conditions.

The mechanical department should be notified as to the status of special tools, jigs or fixtures so as to eliminate delays due to insufficient manufacturing equipment of the sort it is responsible for supplying.

Balance of Work Basis of Planning

Even with the pronounced advantage of properly planning work ahead of machines and operators through the medium of the route sheets, tickets, planning boards, pneumatic tubes and an excellent order of work or scheduling scheme, it has been demonstrated that the balance of work supplies a basis for better planning than was possible before its introduction.

The advantage of the balance of work function is already recognized by some of the leading managers and management engineers of the country and is conceded by them to fill a long felt want of the planning department, and where successfully used, it is so used because it stands on its own merits; it is probably due to the fact that its importance is not recognized or that its existence is not realized that it is not more commonly used in existing planning departments today.

It is obvious that the balance of work function is more easily started in planning departments already sucessfully operating, and it is not considered wise to attempt to start

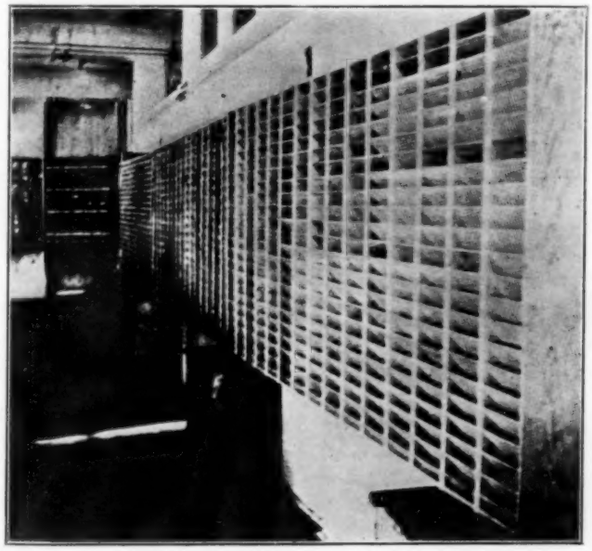


FIG. 1. SORTING TRAY MECHANISM

the balance of work methods in the pioneer stages of the planning department development but to introduce them as soon as a certain degree of perfection of production control has been attained. This period varies in different plants but ordinarily would be as soon as the route sheets, time cards and schedules are sucessfully operating.

* Address delivered at the meeting of the Taylor Society, Rochester, N. Y., May 6, 7, 8, 1920.

The balance of work is based on the factory's manufacturing unit, which may be the pound in plants such as bleacheries operating on a tonnage basis, the yard in concerns such as

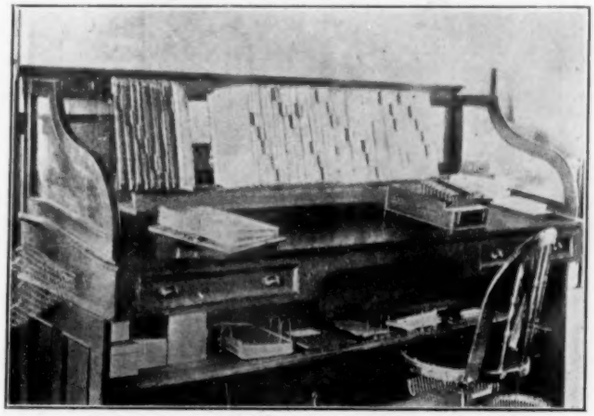


FIG. 2. INDEX VISIBLE MECHANISM

cotton goods finishing plants running on a yard basis, but preferably should be the time unit, especially if the time factory is obtainable as in plant operating on a bonus basis.

In order to successfully operate the balance of work function, it is necessary to ascertain and maintain statistical information regarding the actual manufacturing capacity of all existing machines or work places, employes and special tools on a weekly basis. This information is usually obtainable from data already on hand in the planning, employment and mechanical departments.

Several types of mechanism for maintaining the balance of work have already been successfully used, but the type of equipment to be adopted depends largely on circumstances or local conditions and opinions.

A sorting tray method illustrated in Fig. 1 has been considered desirable to some.

An index visible (Fig. 2) has been used by others.

A hook type planning board (Fig. 3) has been chosen by others.

Any one of the above types is acceptable because it serves the purpose ideally if it is assured that it properly ties in with existing methods or mechanism and harmonizes with the policies and conditions of the factory.

Whatever the type of mechanism to be used its general arrangement is the same as that of either of the others, and the pockets in the trays or the card holders on the index visible or the hooks on the boards are labelled so as to indicate by classes the available manufacturing capacity for each of four weeks, it being considered important to submit weekly balance of work reports to the management covering a four week period, beginning with the current weeks. These available capacities are changed as the equipment or personnel varies.

Determining Weekly Capacity

The weekly available capacity of all classes of machines, operators and tools is determined by ascertaining the number of hours the plant is operating in a week and multiplying this by the number of machines, operators or tools available.

In determining the available machine capacity due allowance should be made for unavoidable idleness, such as time required to supply sufficient steam pressure to dry cans in finishing plants before they are started each morning. Similarly proper allowance should be made for special machinery which is used only at intermittent periods, such as extra large planers for certain work in machine shop practice.

Likewise in ascertaining available labor capacity a proper allowance should be made for absentees.

Ordinarily no allowance is necessary in determining available tool capacity especially in plants where through a modern central tool room all special tools are constantly maintained in usable condition.

For balance of work purposes the available quantities should represent the actual net available manufacturing capacity in all cases, so that when comparing work assigned to

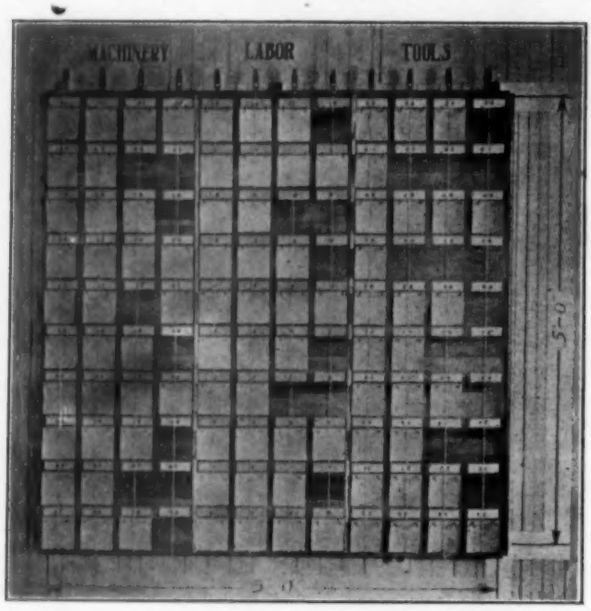


FIG. 3. HOOK TYPE PLANNING BOARD

capacity available no deduction is necessary to ascertain how far ahead equipment is booked for current orders or the earliest time at which manufacturing capacity is available.

Using the existing route sheets and manufacturing schedules as a guide, balance of work tickets are prepared for each operation of every lot or order as follows (Fig. 4):

One machine ticket (Fig. 4) for each operation to be done; this ticket contains the order symbol, name of operation, quality, bonus time allowed, the date by which the operation is scheduled to be completed and the machine class symbol.

One labor ticket (Fig. 4) for each operation to be done, containing the order symbol, name of operation, quantity, bonus time allowed, the date the operation is scheduled to be completed and the labor class symbol.

One tool ticket (Fig. 4) for each operation requiring such special tools for which a balance of work statement is to be submitted, containing the order symbol, name of operation, quantity, bonus time allowed, the date by which the operation is scheduled to be finished and the tool class symbol.

These forms should be so designed as to enable their preparation on a duplicator and from the same original from which time tickets, move orders, inspection tickets, etc. are made.

Balance of Work Report

A balance of work report (Fig. 5) is used in submitting weekly balance of work statements to the general manager, employment manager and mechanical superintendent and such other executives as may be designated.

The report is divided into three major sections, one each for machines, labor and tools. Each of these sections is sub-divided into minor sections as follows:— class, first week, second week, third week, and fourth week. Each of the twelve weekly sections has two columns, one headed "Available" and the other "Assigned."

The various permanent machine and labor class symbols are listed in the class columns in such fashion as to segregate machines by classes of employes operating them. The tools are listed by classes regardless of the class of machine or operators using them, since a special tool may be required by a number of different classes of machines and operators.

The balance of work here described used the hook type board and is operated in a plant controlled from a central planning department using route sheets, schedules and time cards and having bonus time allowed factors available.

As balance of work tickets are prepared they are arranged on the board by machine, labor and tool classes and according to weeks in which the jobs they represent are scheduled to be completed, thus indicating work assigned to various classes of manufacturing capacity by weeks, but which has not yet been completed.

As finished time cards are received they are used as authority to remove their corresponding balance of work tickets from the board all remaining balance of work tickets, therefore, represent jobs assigned but not completed. This particular arrangement of the balance of work tickets offers a very simple and satisfactory means of compiling lists of jobs scheduled but not yet completed, and is especially valuable in making statements of jobs not being kept up to schedule. Usually a more laborious method is necessary to properly ascertain which jobs, if any, are overdue. Sometimes it is done by actually referring to a large number of route sheets or schedule sheets, and, depending on the number of sheets to which it is necessary to refer, is more less inaccurate.

Preparing the Report

At the end of each week (or oftener if desired) the balance of work report is prepared and the entries thereon are supported by the information on the board and on the balance of work tickets arranged on the board.

The actual work assigned to each class is entered in the four assigned columns, one column for each week. This information is obtained by totaling the time periods or quantities appearing on all balance of work tickets on the board at the time.

Assigned quantities exceeding available quantities are entered in red so as to emphasize this condition whenever and wherever occurring.

The balance of work reports may be used to great advantage in plotting curves to demonstrate in condensed form the fluctuations of work ahead of the factory and historically represent "feast or famine" conditions. This feature has an important bearing on the determination or changing of policies in connection with attempts to minimize periodic unemployment in industries engaged in a seasonal business.

BALANCE OF WORK

MACHINES

C

OPERATION

QUANTITY	TIME ALLOWED
DATE SCHEDULED	MACH. CLASS

FIG. 4. MACHINE TICKET

It is really surprising to note the conditions usually shown by the adoption of the balance of work method.

A certain cotton goods finishing plant was being operated in such fashion as to practically guarantee that the prescribed tonnage was put into process in the grey room, but without proper regard to the condition of the departments subsequent

to bleaching. The management was proud of the fact that the required quantity of goods was put in each day, but could not understand why the finishing departments were constantly over-loaded and that only by superhuman effort on the part of the foremen and constant urging by the sales department that it was possible to give the howling customers anything like even periodic service; nor did it appreciate the reasons for the tremendous quantity of goods in process at all times with the natural congestion in the factory, shortage of trucks and abnormal amount of soiled or otherwise damaged material.

By the introduction of the balance of work, the condition improved and the policies of the plant were changed to such an extent that goods were more intelligently put in and therefore more economically finished and the service to the customers improved.

The management was also convinced that there is an advantage in reducing tonnage put in on certain days, since the disadvantages resulting in the bleachery were more than offset by advantages in the finishing departments.

The proper operation of the balance of work makes it possible to visualize conditions in the entire plant just as the planning board makes it possible to visualize conditions in any specific department insofar as work ahead of individual machines is concerned.

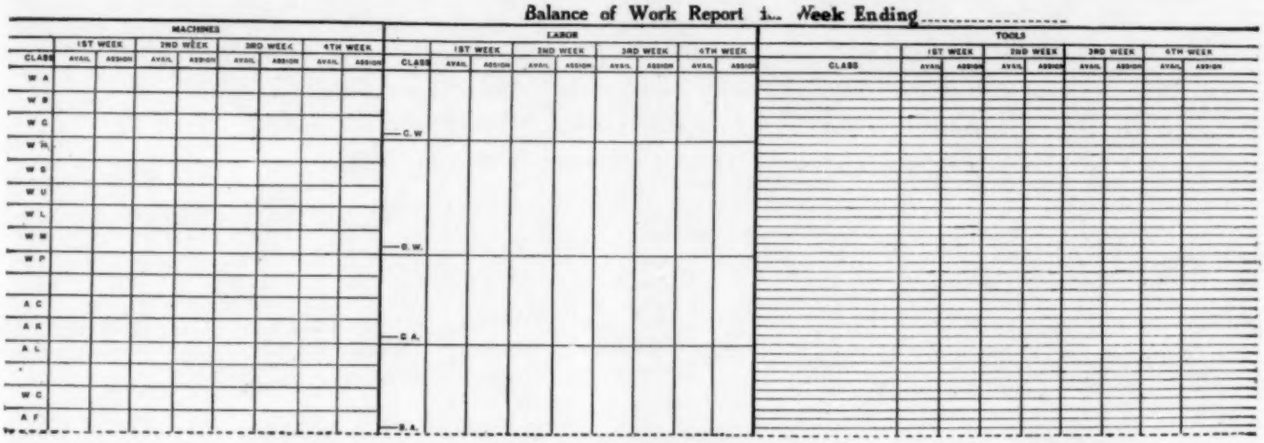


FIG. 5. BALANCE OF WORK REPORT

The balance of work offers finally a simple but effective means of submitting condensed statements of conditions to the executive for any period desired, and these reports when intelligently studied offer scientific data which should and usually does make it possible to operate an industry more nearly as it should be to insure greater production, higher wages, lower costs, proper working hours and better service to customers, and thus prepare it for the rapidly returning days of competition.

The Value of Inexperience

By Chesla C. Sherlock

"Wanted—Experienced man to—"

"Wanted—Man to learn trade. No experience necessary." Or "Man to sell our grief dispenser. No experience necessary."

The above are the two commonest forms of "want ads." They are to be found in any daily in the country. The Sunday paper abounds with them.

It is a peculiar fact that concerns extremely anxious to secure salesmen for crews to push some speciality, especially house to house canvassers alway use the bait: "No experience necessary." The concern that has a real position open always demands an experienced man.

What does it all mean, anyway? To read the advertisements printed in a well-known business periodical asking for executives and high-class men in all walks of life, one would imagine that the woods are full of A No 1 perfect business men, thoroughly experienced and equipped to tackle any position in the business world.

As a matter of fact, we all know that thoroughly experienced and capable men are as scarce as hen's teeth. Then why does the employer always write specifications into his want ad calling for a type of man he knows is not to be had in that way? Is it that he is hoping to attract a man from another concern? Or is he just following "custom" and content to take put-luck?

I once knew a country youngster who came down to the city to get a job. In the way of schooling he was short; his experience ledger was absolutely blank; he was slow and rather stupid at the simplest kind of head work, but an old business man took a liking to him simply because he was fresh from the farm, and he gave him a chance at ten dollars a week.

The boy was down to work an hour earlier than anyone else every morning because he had been trained to get up early. He had an abnormally curious turn of mind, and although he had never been in Missouri in all his life he certainly was a native of that state from away back. You couldn't do a thing within range of his vision without explaining just why it was done that way.

Lacking experience, he failed to fall into the accepted ruts that experienced office people do. He demanded to be shown and he soon got to be an office pest.

But in three years that fellow was assistant to the Old Man. Why? Pull? Not on your life! He won it fairly and squarely and because he had come into the place inexperienced! He saw any number of foolish customs in that office that those of us who were experienced and seasoned did not see .He asked the Boss a "foolish question" one night with the result that one lost motion was cut out in routing freight shipments that saved our customers $5700 annually.

When men are fired, nine times out of ten, it is the inexperienced man. The fellows who have settled down to their everyday routine, who know their little corner and keep it are the ones who are retained in the business.

And sometimes the best thing that can happen to an organization that's going stale is to fire an experienced man and hire one that is inexperienced.

If a business man demands an experienced applicant when he needs help or a new executive, he must know that if the man is experienced that he has learned his experience at the expense of someone else. If he is free to come in response to your ad, then the chances are that he was a failure in the position where he acquired his "experience" else the former employer would never have permitted him to go.

Do you want men who have failed in the process of acquiring that experience you are demanding, or do you want a good man to train up to your business standards?

A French Attack on the Straightside

The following article by Baudry de Saunier, editor of Omnia, a French automobile journal, severely criticises the American preference for the straightside tire and sets forth the advantages of the clincher type. Upon the opposite page is a second article by S. P. Thacher, technical assistant to the president of the United States Tire Company, which answers the criticisms of M. de Saunier and gives the reasons for our adoption of the straightside.

Europeans versed in the subject of automobiles, who during the war and since then have seen American motor cars—excepting most Fords—have been surprised at the unexpected way in which pneumatic tires are mounted on these machines. The European sense of motorist and mechanic has been indeed shocked, for Americans in their tires have gone back to rims with detachable side rings, and even split rings, which the countries that invented the automobile, with France in the lead, devised in the very early days of pneumatic tires, but soon found to be wrong in principle and discarded.

We in France thought that these beginners' mistakes had been corrected long since, but now we find that they have been brought to light again. And these tires that we long ago laid aside as unsatisfactory Americans are trying to have us accept, that they may open a new market for themselves in our country.

Will the European tire, snugly hooked on its rim, give way to the American tire, which is "ringed" to the rim? This is a plain statement of the problem. Let us examine it, for a system almost unanimously adopted by more than seven million drivers motoring on American soil furnishes food for thought. It certainly does.

Is it possible that the Americans have found practical what we were too dense to find useful in the past?

The first and fundamental fact in this pneumatic tire question is that the Americans have never been able to attain perfection in the manufacture of soft tire beads. They have never been able fully to obtain that combination of strength and flexibility from which the clincher bead tire derives its true value. They grew impatient, they wished to lose no more time in experiments—for to experiment is not "to make money"— and out of the dust of our stock-room they pulled the stiff bead, the bead with cables buried in it, and decided to use this type of bead in spite of everything.

Let us sum up the two devices competing for supremacy.

Europeans mount their tires on one-piece rims by stretching their flexible beads over a groove into which the beads slip once they are in place. This is the clincher type.

Americans do away with the beads, make the sides of their tires straight and vertical, and insert into them non-stretchable steel cables, which makes it necessary first to split the rim and then to reinforce the parts.

At this point I feel my reader wondering why the mere fact of crossing the ocean has enabled a principle that experience proved to be wrong in France, in England, in Italy, and in Germany, to conquer the United States. For the correct answer to this we must consider habits and conditions.

Americans Not Mechanics

Generally speaking, the majority of Americans are not mechanics. They do not like their automobiles; they do not love them. They care nothing about the details of their mechanism and above all, they rarely ever touch parts of the chassis other than the steering wheel and the levers. And as to the rest of the car, the American never touches it any more than he touches his shoes in the street. He wants his car to carry him, as comfortably as possible. That is all. If he has a break-down, in nine cases out of ten he does not personally try to solve the trouble. He puts his car in a garage and leaves the work to a professional repairman.

This custom is easy to follow over there for the reason that automobile riding is largely restricted to cities, big suburbs, and highways, where repair shops are abundant. Such a great number of cars used in rather limited territory necessarily results in a huge number of repair specialists, it is easy to understand that these specialists can afford first class shop equipment.

On the other hand, in France the number of automobiles in use is comparatively insignificant—90,000 in 1919. Motor cars are widely scattered and repairmen are few and far between. For these reasons the solution of tire troubles falls on the driver and the work has to be done on the road.

This difference of conditions is vital. It constitutes practically the whole problem.

The indolence of American drivers, which is due to something we French cannot too greatly envy— the great number of cars that makes possible all these service stations—causes the American motorist to be indifferent to these unpleasant complications of which we cannot even bear to think. This difference, as well, explains why, after having enjoyed the comfort of such big tires as the 120- and even 135- millimeter sizes, they have allowed their manufacturers to bring them to the phenomenal sizes of "giant tires."

Phenomenal Sized Tires

These "giants" weigh as high as 220 lbs. But what do the American drivers care? They do not have to handle them themselves! The most they will have to do is to carry a ready mounted and inflated spare tire, provided, of course, that this spare does not weigh more than 110 lbs, and can easily be handled by one man. But never, never, would they try to fit a tire and tube on a rim themselves. They have specialists for that work.

What is this work? Here it is:

To put this tire on its rim, the workman has to remove the side ring of the latter, place the tire and its tube in position on the rim and then replace the ring and a reinforcement in the shape of a lock-ring accompanied by bolts and plates. With such a process, it is easy to see the mechanical complications that are necessary to make a rim detachable so that tire trouble can be solved while on the road.

To cap off this statement of the truth, the horrible truth, we must add that all this highly accurate hardware—the rings are fitted within 1-10 milimeter limits—runs its life along in the mud, and soon reaches the point where it is frozen together by rust. Then what is the American up against?

But the American driver doesn't care; he is not the one who does the work. The American specialist doesn't care; he has a machine tool to do his work.

But we French? All alone on a road? Struggling for more than an hour in the middle of the night or in a rain-storm—two enemies that often fall on us together—with a tire that weighs 110 pounds, that laughs like an anvil under the blows of a sledge hammer. Think of our martyrdom. I saw one of those straightside tires, hardened with rust, withstand for ten minutes in an American garage the combined efforts of three specialists who were doing their level best to show me its advantages.

For a final and supreme complication, in sharp turns the straight side tire displaces itself slightly on the rim and the tube slides into the opening, giving the bead, which is as hard as steel, the opportunity to pinch and puncture it. Manufacturers, for this reason, recommend the use of a heavy rubber flap, which may prevent the tube from slipping under the bead, but which certainly makes this tire more remote, if it can be made more remote, from being practicable.

When in their cars Americans will be able to escape from their cities, suburbs and wagon tracks, on which they have been "circuiting" all their lives; when they will be able to

truly set out on that charming entity, captivating in spite of its changeable moods, which we call "The Road," and are all familiar with, but which most of them never saw, they will understand the enormity of their error. For the time being, they are still unable to distinguish between the busy city and the open country, between a multiplicity of helps and total abandonment, between the frown caused by a delay on a boulevard and the despair of breaking down all alone in the middle of the woods. They will discover that while in a city one can manage with all sorts of follies and mistakes, but "The Road" is severe; it never forgives. The city offers immediate solutions to all problems; whereas there is not a single problem that the road does not complicate, even to the point of making it fatal.

It could be added, with the same amount of accuracy, that ignorance of what really can be called a road leads Americans to be ignorant of what is true speed. They can transport themselves quickly in their automobiles, but very rarely do they have the opportunity to enjoy full speed and the pleasure of prolonged rapid traveling. Would real automobile connoisseurs, connoisseurs of the real living car, tolerate that the periphery of their wheels be burdened, that the feet of their horses be weighted down with lead? Just fasten a kilo (2.20 pounds) on the rim of your bicycle, and you will note what happens to the kilometer record.

Americans say that the volume of one of their tires of a given section is slightly larger than ours. Is that sufficient foundation for a revolution?

They say their tires last longer than ours. But, they are careful not to prove it.

Occasionally they endeavor to insinuate that their "giant" tires do not puncture. They slip such statements into your ears, but they do not dare to print them. The truth of the matter is that an 1800 franc casing, like a poor little 150 franc one, is at the mercy of a sardine tin hidden in the dust.

The truth of the matter is that the Americans never have dared to test their "giant" tires otherwise than on trucks or very heavily laden cars, on chosen routes where specialists are always at hand. The English tried "giant" tires on motor buses and soon gave them up. Several American tire manufacturers today are wondering whether the true solution of pneumatics for motor trucks is not in six-wheeled vehicles. (France long ago found that impracticable). On this subject I can refer you to the very curious communication of the President of the Society of Automotive Engineers and to the April 20, 1920, issue of The Scientific American.

The American tire has no enemy more merciless than the American press.

In conclusion, no matter how you look at the American tire question, you get the impression, the certitude, that it is wholly unfit for the requirements of European motorists, requirements that can be recapitulated in those few simple words: to get out of trouble without outside help and to do so quickly.

The American Straightside Tire

By S. P. Thatcher

Technical Assistant to the President United States Tire Company

All American pneumatic tires of "double tube" construction, whether for bicycles, buggies, automobiles, were made with clincher beads up to 1900. In that year one of the factories now manufacturing United States Tires produced the first straightside automobile tire in this country. The advantages of this type of tire fastening were quickly recognized by the motoring public and by tire manufacturers, and with the development of the motor car and truck industry, the straightside tire has become our recognized standard for all but the lightest vehicles. It should be noted that we had more motor vehicles fifteen years ago than France has today, while today we have ninety times as many.

The pioneer straightside tire was built because it was felt that a more dependable, safe and simple fastening than the hooked bead of the clincher type was needed for heavier cars. For safety and dependability, we wanted a tire which could not under any conditions blow out over the rim—one in which the beads did not require a secondary locking device such as lugs, spreaders, etc., to hold them in place once the primary locking device—inflation pressure—suddenly vanished through a puncture or blowout. We also sought a combination of bead and rim contour that would not allow the gouging of the tire by the edge of the rim when sudden deflation occurred in service.

As our development of the straightside tire progressed, we found that we had introduced not only a more safe, dependable and simple fastening, but also a tire which would deliver consistently greater mileage than the best clincher tire we, or any others, could build. In studying the reasons for this difference, we have come to the conclusion that they lie in the better structural arrangement of the plies of fabric or cord at and above the bead proper and in the larger volume of air carried by the straightside type. These are the basic reasons and they explain the margin in favor of the straightside when tires of both types go through a road test without injury. The margin becomes still greater if the tires are run flat even the minimum distance required to stop the car after a puncture or cut has occurred. Under these conditions the deflated straightside tire lies naturally over the out-turned flanges of the rim without injury, while the in-turned flanges of the clincher rim cut and chafe many miles out of the clincher tire. Furthermore, the straightside tire will withstand under-inflation far better than will the clincher.

It is very easy to catch the tube under the toe of a clincher bead in mounting the tire—something which *can not happen* to the tube in a straightside tire. Also, unless lugs are used, the tube in a clincher tire can easily be pinched under the beads when the toes of the latter rock as the car takes a curve at speed. In the straightside type there is no rocking of the beads under any conditions.

I have read M. de Saunier's article in its entirety and congratulate the Editor for omitting those passages which add nothing to the argument and which do not, I am sure, represent the sentiments of the French automobile and tire engineers, for whom their American confreres have the highest respect and admiration. We certainly will not plead guilty to the charge of having our tire changing done for us. There are no more self reliant people than ourselves. We insist on knowing intimately the everyday things with which we come in contact, and automobile tires are in this category. Of course, we carry spare tires inflated on extra demountable rims or wheels. We do this so as to avoid delays if mishaps occur. But when we return from our journey we replace the punctured tube much more quickly and comfortably than do our friends across the water with their lugs, spreaders, security bolts and contraptions for urging rusted beads to relinquish their deathlike grip in the rim and for stretching and straining those beads over the rim flanges. The extent of our kit is a pair of hands and occasionally a screw driver. Our problem is so well solved that it is possible to see parties of women touring on "The Road" in our great Southwest where one can drive much further than across the whole of France without finding a single human habitation.

The same certainty, dependability and simplicity of our straightside passenger car tires is found in our pneumatic truck tires. These large tires could not have been possible without the straightside bead and who will deny that they are, and will continue to be, one of the principal factors in the development of highway transportation?

Tire manufacturers in some of the English colonies have been making straightside tires for several years and now English manufacturers are rushing to the straightside standard. In fact one of the largest French tire manufacturers has recently fallen in line.

To quote M. de Saunier's fifth paragraph "A system almost unanimously adopted by more than seven million drivers motoring on American soil furnishes food for thought. It certainly does."

Personals of the Rubber Trade

Henry Alexander Wickham Honored—Burns Heads Horse Shoe Rubber—New United States Advertising Manager—Tribute to Edwin C. McGraw—India Adds to Staff—Peter With Goodrich Branch

Henry Alexander Wickham Honored

Word has been received from England of the knighting of Henry Alexander Wickham in recognition of his services with respect to the rubber plantations in the Far East.

Mr. Wickham is known to many as the "Father of the Rubber Plantation Industry." Forty years ago in 1876 Mr. Wickham succeeded in bringing the seeds of the Hevea brasiliensis from the rubber country of the Amazon to England. Arriving there the seeds were taken to Kew where in a short time 7,000 young Hevea plants were raised. These were sent to the Eastern Tropic Botanic Gardens, principally Ceylon. From these beginnings has sprung the the entire rubber plantation industry of the Far East.

In 1911 Mr.Wickham's activities were acknowledged by the Rubber Growers Association of London and the Planters Association of Malaya.These two organizations combined and presented Mr. Wickham with a check for 1,000 guineas and an annuity. He was also presented with the gold medal of the Rubbers Grower's Association.

Burns Heads Horse Shoe Rubber

L. M. Burns, who recently became associated with the Racine Auto Tire Company, Racine, Wis., has been made head of the Horse Shoe Rubber Company of Missouri, the distributing organization for Horse Shoe Tires in Kansas and Missouri. Mr. Burns, until January 15th, was vice president and general sales manager of the J. I. Case Plow Works Company, of Racine, Wis.

The Horse Shoe Rubber Company of Missouri succeeds the Lindman-Funk Company, distributors, who introduced the Horse Shoe Tire line in the two states. Offices are already established in Kansas City and St. Louis. Mr. Burns will be directly in charge of all sales in the two states. W. E. McClurg will be vice-president of the new organization and will be in charge of the St. Louis office.

Mr. Burns who is financially interested in the Racine Auto Tire Company is one of the outstanding figures in the farm implement and tractor field. His vision of the possibilities of the automotive field resulted in his becoming active head of the Horse Shoe distributing organization. He was born on a farm in Illinois and received a district school education followed by a short business college course. He was sixteen years of age when he became connected with Illinois and received a district school Kingman & Company, one of the largest implement jobbing houses in the middle west. From office boy to manager of the St. Louis office he studied all phases of the implement business and following the liquidation of the Kingman Company he spent a short time in the automobile field then in its infancy in St. Louis. On January 1st, 1913, he became general sales manager of the J. I. Case Plow Works and upon the reorganization of the company was elected vice-president, which position he held until his resignation on January 15th of this year. Since that time he has been making an active study of the rubber industry.

L. M. Burns

New U. S. Advertising Manager

R. S. Butler, who has been identified with the United States Rubber Co. as manager of its commercial research library and as officially in charge of the company's big office building in New York city, has been made general advertising manager of the U. S. system. Mr. Butler will continue to direct the company's research library in connection with his new duties which he takes over from Raymond S. Willis, who undertook them temporarily in addition to his duties as purchasing agent early in the year, following the resignation of R. W. Ashcroft.

Tribute to Edwin C. McGraw

"The Rubber Leaf" for June, 1920, house organ of The McGraw Tire and Rubber Co., is an impressive memorial to Edwin C. McGraw, president of the company, who died at Miami, Fla., May 24. The issue, beautifully done typographically, contains tributes paid the late Mr. McGraw by his business associates, a brief biographical sketch, and copies of resolutions on his passing.

India Adds to Staff

Two more important additions have been made to the executive staff of The India Tire & Rubber Company of Akron.

K. C. Burtscher, well known in railroad circles through a former connection with the Wheeling and Lake Erie R. R., has been appointed traffic manager. He also spent two years in the traffic department of The Goodyear Tire & Rubber Company.

The Southern Wisconsin territory, which has become an unusually important distributing district for India tires, is now placed under the supervision of Calvin F. Troupe, former branch manager for the Fisk Tire & Rubber Company, in Milwaukee, Wis. Mr. Troupe will make his headquarters in Milwaukee and work in direct connection with the Ramler Rubber Company, India distributor in that city.

Peter Heads Goodrich Plant

Succeeding E. A. Meek, who has been in charge for the past two years, Ralph W. Peter has been appointed supervisor of the Fort Wayne branch of the B. F. Goodrich Rubber Company, with headquarters at 730 Barr street. Mr. Peter has been with the company since his graduation from Wabash College in 1911.

For several years Mr. Peter has been in Goodrich branches along the Pacific coast. His wide and varied experience has thoroughly fitted him for his position at the head of the Fort Wayne branch. Extensive training in the big rubber factory has made him an authority on every phase of the product.

The new manager is a veteran of the great war, having served several months in France. He is a member of the American Legion.

Industrial Motion Pictures

A new idea in the exhibition of high class industrial motion-pictures has been evolved by Camilla Donworth, president of "Films-Of-Business" who has entered into an arrangement with the Rialto Theatre, New York by which that place of amusement will be turned into a temple of industry on Tuesday and Thursday mornings from 10 to 12. On these days, the theatre will be devoted to special programs of films dealing with Americanization, vocational work, science, industry, sales ship, psychology, merchandising, etc.

Admission to these entertainments will be free, tickets for the show will be distributed by the merchants and manufacturers whose films are to be shown, or they may be had at the door on application.

Scrap Rubber Division Meets

The Scrap Rubber Division of the National Association of Waste Material Dealers held a special meeting on Wednesday, June 30, at 2:30 p. m., at the Association's headquarters in the Times Building, New York, to pass on the new scrap rubber packing circular.

New Firestone Branch Manager

W. E. Difford of Akron, Ohio has been appointed manager of the Firestone Tire Company's new direct factory branch in Louisville for Kentucky distribution.

News from the Trade at Large

Goodrich Building Expansion—Allen Plant Progressing—Goodyear's First California Tire—Dural Rubber Aids Farmers—A. Daigger Adds Service Department—New Firm in Kentucky—Rubber Plant Burns

Goodrich Building Expansion

One of the largest building expansions in the automotive industry at present is that of the B. F. Goodrich Rubber Company at Akron, Ohio. New construction is in progress which will increase the size of the plant twenty per cent. and cost, with the new equipment and machinery, in excess of $10,000,000.

The new buildings will provide 779,000 square feet additional floor space, making a total of 4,554,304 square feet devoted to the manufacture of tires, hose, boots and shoes, and other rubber goods. Several thousand additional workers will be required next year to turn out the increased production planned.

The largest of the new buildings under construction is an eight story warehouse for raw materials with 530,000 square feet of floor space. When completed it will be the largest factory building in the city. The second largest building will have nearly 200,000 square feet and will be used exclusively for tire building.

Other new buildings being erected include a giant water softening plant, an electric current transformer station, a large refrigeration muilding, and an extension to the boiler house of Mill 2.

The contractors in charge of the work are cramming weeks into days in their efforts to complete the building program during 1920. In spite of annoying delays in securing materials they are going rapidly ahead, working day and night, and it is expected that the program will be nearly completed before winter.

A better idea of the extent of the new construction can be obtained from the fact that the added floor space alone is larger than that of three-fourths of the rubber companies of the United States. It emphasizes the steady growth of the Goodrich company since it was organized fifty years ago, many years before any other rubber factory was opened in the "Rubber City."

The original plant of the Goodrich was a building 40 by 100 feet and only thirty-five employes were on the first payroll. Today this original building could be tucked away and lost in any one of a dozen of the company's buildings. The force of thirty-five employes has grown to an army of 28,000 men and women.

Allen Plant Progressing

The first unit of the Allen Tire and Rubber Company is progresing to such an extent that the brick work has reached the second story.

July marks an epoch in the history of the company by the arrival of two carloads of machinery, which will be installed as soon as convenient. The first shipment of crude rubber has also been received, and it is expected that within the next sixty or ninety days this equipment will be producing tires and tubes to the extent of five hundred of each every eight hours.

The forms of the foundations of the power plant are completed to be poured. The excavating for the foundations of the second unit is also progressing, and the carpenters will be working on these forms within the next few weeks.

Goodyear's First California Tire

The accompanying illustration shows the first tire to be manufactured in the Los Angeles, California, plant of the Goodyear Tire & Rubber Co. The tire was made on June 14 on which day the new factory was formally opened. At the left of the illustration is Clifton S'usser, Los Angeles factory manager, while on the right is P. W. Litchfield, vice-president and factory manager of the Akron factories.

THE FIRST TIRE TO BE MADE AT GOODYEAR'S CALIFORNIA PLANT

Dural Aids Farmers

On June the 26th.the Dural Rubber Corporation of Flemington, N. J., closed and released their employes for farm work until July 12th, paying them for the difference between their earnings on the farm and the amount of their weekly factory earnings.

Edgar H. Wilson, president and general manager of the corporation admits that this arrangement means a distinct sacrifice but the result of a careful investigation justifies this step and it is believed present conditions on farms could be aided by all manufacturers of semi essential products adopting a plan that would give the farmers proper labor from planting to harvest or insure the farmer of sufficient labor to harvest his crops and thereby urge the farmer to plant a greater acreage until the present emergency is at an end.

A. Daigger Adds Service Department

A. Daigger & Company, manufacturers and exporters of chemicals, colors and oils, at 54 West Kinzie street, Chicago, Ill., have issued a recent anouncement to the effect that they have inaugurated a rubber makers' service department as an adjunct to their laboratory research department.

The new department will be in charge of an experienced chemist and rubber man who is prepared to take up any difficulties submitted by the trade. The firm states that absolutely no obligation will be incurred by firms requesting information as this department will furnish exclusively free service for manufacturers. In addition to the foregoing special announcements will be made from time to time with regard to rubber problems including notes on market conditions as well as technical problems involved in the rubber industry.

New Firm in Kentucky

From 1500 to 2500 cord tires will be the daily capacity of the Kentucy Tire & Rubber Association, Louisville, Ky., organized recently with $1,000,000 capital. This corporation will erect a 4-unit plant 280x50 feet, H. J. Huff of Louisville being the architect. H. P. Didricksen of Louisville is the company's president, and the Akron Engineering Co., Akron, O., is the construction engineer for its plant.

Rubber Plant Burns

A fire believed to have originated from sparks from a Pennsylvania Railroad Company locomotive, destroyed the plant of the Trenton Scrap Rubber Company of Trenton, N.J., resulting in close to $300,000 damage. Fireman Harry Higginsbotham, of Engine Company, No. 3, was seriously hurt, and several firemen narowly escaped death when a roof caved in.

Goodrich Stock Sold to Employes

(Special Akron Correspondence)

Details of the employes' stock subscription plan, recently announced by the B. F. Goodrich Co., were given out by officials recently when it was announced that common stock will be sold to the employes at $65 a share on a weekly payment basis of twenty-five cents.

Under the schedule arranged in the plan, stock purchased by the employes can be paid for at the end of three years and twenty-four weeks, even though the payments for the period will total only $44.98, per share. Stock dividends and service credits, accumulated during the period, will make up the difference between this figure and the stock purchase price plus interest.

Every time the company pays a dividend on its common stock it will credit a like amount toward the payment of each share of stock on which employes are making payment. At the present dividend rate, such dividends will amount to $21 per share during the period payment is being made.

The employe will be further credited with $6 on each share of stock purchased through the service credit plan which provides $1 credit on each share a year from date of first payment, $2 at the end of the second year, and $3 at the end of the third year. The service credits will be given even after the stock is paid for.

If the employe remains in the service of the company he will receive in cash at the end of the fourth year a service credit of $4 a share and at the end of the fifth year $5 a share. This still further reduces the net amount of cash paid by the employe for the stock, making the total net outlay per share $35.98.

In a recent statement to the employes the executive committee said.

"It is believed that the terms of the company's plan will prove attractive but the company wishes it understood from the start that there is no reason why any employe should subscribe if he does not wish to do so, and his standing with the company will not be effected in any way by the decision.

"Employes who invest their money in the stock of the company with thought for the future and with the intention of retaining their stock need not be alarmed by fluctuations in the market quotations of the stock. Market quotations may change from time to time, but the value of the stock, representing, as it does, a part ownership in the company, does not change by reason of fluctuations in market quotations."

Any employe who has been with the company for three consecutive months can buy one share of stock for each $300 of annual earnings, paying 25 cents a share per week. If an employe leaves the company or finds it necessary to cancel his subscription, he will be paid back all he has paid in plus 6 per cent interest.

Special provision is made for cases where the employe dies or is disabled before payment is complete. In such cases, the unpaid balance can be paid in a lump sum and the stock received; the weekly payments can be continued until the stock is fully paid; the company will return all payments with amounts credited towards payments as provided in the plan or the company will cancel the subscription and pay over the then market value of the stock less any unpaid balance due on the subscription.

Employes who have been retired from service under the company's annuity plan are not eligible to subscribe for stock under this plan but any employe who while in active service has subscribed and has later been retired with a service annuity may continue to keep up his payments and receive the stock when fully paid for.

Martin Representative Sails for Europe

Ludwig B. Frey, foreign traveling representative for the Martin Tire Corp., New York, recently sailed on his third trip of the year to Europe. During his previous trips abroad Mr. Frey succeeded in building up a foreign demand for Major, Metric and Martin cord tires, despite the unfavorable exchange situation. With the recent improvement in exchange he looks forward to closing many accounts for the Martin company. Mr. Frey reported upon his return from his last trip that the demand for American made tires was unprecedented in France, Switzerland and Belgium and that it would be some time before the local manufacturers could overcome the shortage of tires created during the war. His present trip will include Germany.

Advance in Tire Prices Rumored

(Special Akron Correspondence)

It is an open secret in rubber circles that sales representatives of the large tire manufacturing circles are discussing the possibility of another advance in prices. Just when this advance will come, if ever, and how much it will be has not been determined, it is said.

A few months ago when boosts in tire prices were announced, it was said that rising costs of cotton fabrics and manufacturing expenses were the reasons.

The reluctance of officials to discuss the proposed increase prevents any speculation on the reasons at the present time.

Waldron Appointed District Manager

Announcement was made recently of the appointment of L. J. Waldron as New England manager for the Pennsylvania Rubber Company. The appointment comes in the form of a promotion for Mr. Waldron, for it was only at the beginning of the year that he was placed in charge of sales at the Boston office. Mr. Waldron is one of the favorites among the tire trade of New England and customers and competitors have vied with one another in extending congratulations to him.

Nehmelman Sales Manager for Madison

Announcement has been made by the Madison Tire & Rubber Company, Inc., of the appointment of Jean Nehmelman as sales manager of the company. Sylvan E. Weil will continue as assistant sales manager while George Shortmeier has been appointed manager of the New York branch. All have been identified with the Madison Tire & Rubber Company, Inc., since its inception.

Akron Stock Prices

(Special Akron Correspondence)

Transactions on the Akron rubber stock market during the first days of July showed little change in quotations for the majority of the shares. Goodrich is holding around the 62 to 64 mark, while Goodyear common is selling at 130.

Firestone common has dropped to 145 and Miller common to 143.

Following are the quotations for July 2.

	Bid	Asked
Amer. R & T com	83	88
Amazon Rubber	...	98
Firesone T & R com	145	148
do 6 Pct. pfd	89½	90½
do 7 Pct. pfd	90½	91½
General T & R com	...	800
do 7 Pct. pfd	...	97
B. F. Goodrich com	62	64
do 7 Pct. pfd	87½	88½
do 5 yr. 7 Pct. notes	94½	95½
Goodyear T & R com	129	130
do 7 Pct. pfd	86½	87
India Rubber com	...	190
do 8 Pct. pfd	...	90
Mason T & R com	...	25
do 7 Pct. pfd	...	68
Marathon T & R com	45	55
Miller Rubber com	143	146
Mohawk Rubber	...	290
Portage Rubber com	80	86
do 7 Pct. pfd	69	75
Republic Rubber com	1½	2½
do 7 Pct. pfd	...	60
do 8 Pct. pfd	15	25
Rubber Products	...	110
Star Rubber com	160	175
do 8 Pct. pfd	...	100
Swinehart T & R com	...	75
do 7 Pct. pfd	69	80
Phoenix Rubber com	...	22
do pfd.	...	20
Standard Tire com	...	175
do pfd.	...	90

Safety in the Rubber

Plans for extending the activities of the Rubber Section, National Safety Council, to a scope commensurate with the importance of that industry—it is now claiming second place in the list of America's greatest industries—were discussed at a meeting of the Executive Committee of the Rubber Section in Akron, Ohio, June 10.

As the first step in this direction the section organized an engineering committee for which a program of activities will be announced in the near future. Chairman Fitzgerald of the Membership Committee reported that fifteen new members had been secured since the appointment of the committee and that quite a number of other rubber companies were contemplating membership in the Council.

The program committee announced that the president of the United States Tire Company would be one of the speakers at the meeting of the Rubber Section of the Ninth Annual Safety Congress at Milwaukee. Following the meeting the Executive Committee and Fred M. Rosseland of the headquarters staff of the Council made a trip through the new Goodyear Industrial University.

Hohmann-Nelson Opens Branch

The Hohmann-Nelson Co., of Eau Claire, Wis., has recently opened an eastern sales office and sample room at 1599 Nostrand avenue, Brooklyn, N. Y., in charge of B. O. Pallin. The new office will have on display a full line of temperature and time controllers and recording and indicating thermometers of a type specially designed for use on rubber vulcanizers.

MARKETS

Manufactured Rubber Goods

NEW YORK, JULY 6, 1920

Railroad congestion is but little improved and shipments of raw materials are arriving only at intermittent periods. Manufacturers are consequently experiencing considerable difficulty in keeping their plants running on an even schedule and production has been somewhat curtailed. Little hope of an early improvement in the railroad situation exists and conditions ruling at the present time do not hold out much promise of an early solution to the difficulties which are besetting American manufacturers

Prices on many items entering into the manufacture of rubber tires, are showing a downward tendency, but at the present writing the reductions have not been sufficiently large to warrant any reduction in tire prices. Even though prices for raw materials may be somewhat lower, the overhead at many of the factories is being increased by inability to run along smoothly due to temporary shortages of raw materials. Crude rubber prices have been weakening for some time past, and definite price declines have occured during the past fortnight. Some of the chemicals and compounding materials entering into the manufacturing processes have also fallen in price. No reductions in prices of fabrics used have been made, however, and conditions in the tire fabric market are far from weak.

AUTOMOBILE TIRES

With the arrival of the summer touring season retail distributors of tires are doing a brisk business, and this activity is being reflected all along the line. Retailers are entering the market to purchase tires more often than usual, but are buying on a smaller scale because of the tightness of the money market.

Although the demand in consuming markets is active, manufacturers are reported to have large stocks of tires in their warehouses which they are unable to ship to their distributors, owing to the congested condition of the railroads.

Leading tire companies are devoting more attention to truck tires at the present time, and new model tires are being produced from time to time.

BOOTS AND SHOES

There is a better demand for rubber soles and fibre soles, and manufacturers report that business is increasing steadily.

Rubber heel business is booming, and distributors of leading makes report that they are hard pressed to fill the demand. The use of rubber heels on new shoes by manufacturers is increasing, and sales to shoe manufacturers direct are becoming an important factor in the industry, although sales to repairmen still continue the chief outlet for many manufacturers.

MECHANICAL GOODS

A quiet market for rubber belting is reported with buying generally light. Manufacturing is being curtailed in many lines due to congestion of goods in the hands of the makers, and with the wear and tear on belting reduced, buying has been reduced to the same extent.

No large orders for equipment have been placed by the railroads, and buying of suplies is of a spasmodic nature. All of the movable rolling stock on the roads is now in operation, and there is such a heavy demand for freight cars of all varieties that the railroads have not the opportunity of laying up their cars in shops for an overhauling.

MISCELLANEOUS

Druggists are showing interest in their fall supplies of rubber sundries, and the market for these goods is taking on a more active appearance although the buying is generally limited to small lots. Drug stores are featuring sales of several sundries composed partly of rubber, such as hand sprays, massage vibrators, etc. With the early wave of bathing cap buying over, sellers are featuring sales of rubber bathing caps in an effort to clear their present stocks so as to enter the next season with bare shelves.

Cottons, Yarns and Fabrics

NEW YORK, JULY 6, 1920

Cotton crop conditions have improved considerably during the past month, according to the estimate of the Department of Agriculture which was recently issued. The first crop estimate, issued a month ago, showed the crop to be in very poor condition, only about 62.4 per cent of normal.

Despite some poor weather and boll weevil depredations the crop is improving and the latest report of the Department indicates a probable yield of 11,450,000 bales, which, taken with the carry-over of the old crop, will make for a supply of about 15,000,000 bales. The Government estimates, however, are usually conservative, and it is not at all unlikely that the yield may be increased by from 500,000 to 1,000,000 bales before the crop is in. The report disproved the talk of acreage-curtailment, as it showed that there had been an actual increase of nearly 400,000 acres planted to cotton.

Conditions have been generally quiet in Northern markets for the past few weeks, the market swaying back and forth in response to engineering by bull and bear interests. In Southern spot markets, however, there is a feeling of strength on old crop with middling fair holding at from 38.75 to 41.50. Trade buying has been generally slow during this period, the mills being well stocked up and working on a curtailed basis, due to reduced buying. Cotton prices do not play so important a part in prices on finished cotton goods, however, as it has been authoritively estimated that prices in cotton cloths now are fifty per cent over what they should be if gauged by raw cotton prices.

Export buying has been fair during the past week. British markets have been taking larger stocks than for some time past although other foreign buying has been quiet.

SEA ISLAND COTTON

Reports from the Savannah market quote No. 2 Sea Island cotton, or extra choice with average staple, firm on the basis of $1.15 per pound, f. o. b. There is a steady demand for the few small lots offering, some of the demand coming from abroad, French spinners having paid a fancy price for some lots of extra choice Sea Island. The crop will be but a small one this year, many of the growers having given up their fields in discouragement over the damage wrought by insect pests. No further information regarding the acceptance of the Meade cotton, a substitute for Sea Island devised by the Department of Agriculture, by the growers has been received, but it is believed that many of them will give the new cotton a trial and that if the substitute proves successful, the industry may eventually regain its standing.

AMERICAN-EGYPTIAN COTTON

With growing conditions in the Southwest still favorable, a decided increase in the output of Arizona-Egyptian cotton is anticipated for the 1920-1920 season, and there is a strong market ruling, with a good part of the new crop already sold for future delivery. Growers in the dry areas of the Southwest are increasing their acreage, and the industry is spreading. California farmers have started the growing of long staple cotton on an experimental scale in several sections of the

State, while in many localities the industry has already been established.

EGYPTIAN COTTON

The status of the new crop appears to be in some doubt at the present time rumors that the acreage is to be radically cut by Governmental order being very persistent. Early advices, however, tend to show that the growers are not turning to the raising of foodstuffs but are putting in seed for a record crop of long staple cotton. There is a steady market on spot Egyptian cotton reported from the Boston market, but prices have not returned to the high levels ruling before prices broke to 91 to 93 cents per pound a short time ago.

TIRE FABRICS

There is no "open market" basis of prices on tire fabrics quoted and the market is on a nominal basis, with the prices given below giving a fair idea of the values of different varieties. Practically all of the current production is going direct to tire manufacturers and no offerings of any moment in the spot market have been recorded.

DRILLS, SHEETINGS AND ONASBURGS

Continued dullness rules in this branch of the market, and prices are still "soft". Fall River mills are doing a very light business, and prices are touching new low levels for the year as demand holds off. The weekly sales of leading mills in the present market often fall below the daily sales of normal times. In the spot markets, most of the supplies are in the possession of second hands, who are underquoting the market in many instances to clear their holdings. Some of the speculative elements in the market are trying to get out now with as little loss as possible, but as is usual in a declining market, there is little buying in evidence. Prices in general are lower.

HOSE AND BELTING FABRICS

Weakness ruling in other lines of cotton goods have not affected the market on hose and belting fabrics, and prices are strongly held and are tending upward on practically all lines. Belting ducks and hose ducks are strongly maintained on the basis of 78½ to 82 cents per pound, with some holders inclined to ask more. Enameling duck is stronger at 95 cents per pound and higher, according to width. Shoe ducks hold nominally unchanged at 90 to 92 cents on spot, while single filling duck is held firm at 35 to 38 cents, with double filling at 38½ to 40 cents per pound.

TIRE FABRICS

17¼-ounce Sea Island, combed, sq. yd.	Nominal
17¼-ounce Egyptian, combed	2.35@2.50
17¼-ounce Egyptian, carded	2.25@2.40
17¼-ounce Peelers, carded	Nominal
17¼-ounce Peelers, combed	2.25@2.35

DUCKS

Belting (pound basis)	lb.	.78½ @	.82
Hose (pound basis)		.78½ @	.82
Enameling		.95 @	—
Shoe Ducks		.90 @	.92
Single filing	yd.	.35 @	.38
Double filing		.38½ @	.40

DRILLS

37-inch 2.35 yard	yd.	.31 @	—
37-inch 2.75-yard		.27 @	.27½
37-inch 3.00-yard		.26 @	—
37-inch 3.25-yard		.24½ @	.25
37-inch 3.50-yard		.24 @	.24½
37-inch 3.95-yard		.20 @	—
37-inch 2.00-yard Southern		Nominal	
37-inch 2.00-yard Northern		Nominal	
40-inch 2.40-yard Southern		Nominal	
40-inch 2.40-yard Northern		Nominal	
52-inch 1.90-yard Southern		Nominal	
52-inch 1.90-yard Northern		Nominal	

SHEETINGS

40-inch 2.35-yard	yd.	— @	—
40-inch 2.50 yard		.30½ @	—
40-inch 2.85-yard		.28½ @	.29
40-inch 3.00-yard		— @	—
40-inch 3.25-yard		— @	—
40-inch 3.75-yard		.25½ @	.26
40-inch 3.75-yard		.27½ @	.28¼
40-inch 4.25-yard		.21½ @	.22½

Note—In view of the unsettled conditions prevailing in the market at the present time, the prices quoted above are more or less nominal, and are not guaranteed.

BURLAPS
(Carload Lots)

	Cents	Per Yard
7 -ounce 40-inch	—— @	——
7½-ounce 40-inch	9.90 @	——
7½-ounce 45-inch	—— @	——
8 -ounce 40-inch	8.15 @	——
8½-ounce 40-inch	10.75 @	——
10 -ounce 36-inch	10.75 @	——
10 -ounce 40-inch	10.75 @	——
10 -ounce 45-inch	Nominal	
20½-ounce 40-inch	11.00 @	——

Chemicals and Compounding Materials

NEW YORK, JULY 6, 1920

Although conditions in this branch of the market have been generally quiet during the past fortnight, the trend of prices has continued to be downward, and reductions have been registered in many items of the list. Price advances have been negligible, and the trade in general is anticipating a lower price level from now on, it being believed that the peak of high prices was passed several weeks ago. In many lines, there are acute shortages of supplies in spot markets, due mainly to the inability of manufacturers to get through shipments, owing to the congestion on the railroads. These shortages have led to higher prices in some instances, spot holders demanding a premium for goods for prompt shipment in such cases.

LITHARGE

There is a strong tone featuring the market for litharge, and producers are being rushed to keep their output up to the demands of consumers. Much difficulty is also being experienced in getting freight cars in which to make shipments. The market is strongly maintained on the basis of 11¾ to 12¼ cents per pound for American powdered in casks, with quantity prices as follows: 500 to 2,000 pounds, 13.95 cents; 2,000 to 10,000 pounds, 13.61 cents; 10,000 to 30,000 pounds, 13.12 cents; carlots, minimum 15 tons, 12.98 cents; in 100 pound kegs for less than 500 pounds, 15½ cents per pound.

LITHOPONE

Some small shipments of imported lithopone are reaching American manufacturers, but these supplies are held down to a minimum. The market on domestic is showing a strong tone, with producers well booked up for the remainder of the year. Producers quote the market steady at 8 to 8¼ cents per pound, but the market in second hands is held considerably above this figure.

BENZOL AND OTHER CRUDES

Light offerings are keeping the market in a strong position, and producers are holding the market firm on the basis of 28 cents per gallon for 90 per cent pure, with the pure held firm at 30 cents per gallon. Naptha is scarce and strong at 25 cents per gallon, Phenol is firm at 12 cents per pound| Xylol holds steady and unchanged at 35 cents per gallon for commercial and 40 cents for pure, with offerings restricted to small lots.

WHITING

Restricted offerings of whiting are holding the market in a strong position, and makers are working at capacity whenever possible to take care of the demand. Manufacturers are having considerable difficulty in obtaining sufficient stocks of chalk. The market is held steady at $1.40 for commercial, $1.45 for gilders' bolted, and $1.75 for American Paris white, English cliffstone holding at $2.00.

BARYTES

Although producers in the South and West are getting out shipments on better time, they are still behind in their business and are not in a position to book further business for near delivery. Some supplies are being brought into the United States from Germany by lithopone manufacturers who are unable to obtain sufficient of the domestic to fill their needs.

DRY COLORS

Demand continues strong with spots well sold up, and the market firm on colors for prompt or nearby delivery. Blacks are steady and moving in fair volume to consumers. Browns are holding firm under light offerings of imported. Blues are strong, with iron blues held firm at $1.00 on the spot. Chrome green is scarce and high. Chrome yellows are steady at 35 cents per pound, under an active inquiry. Reds are strongly held, with some variance in quotations of leading producers.

INTERMEDIATES

Aniline oil is quoted lower, with oil in drums having sold down to 33 cents per pound, drums returnable. Oil with drums is held at 36½ cents f. a. s. Benzidine is showing an easier undertone. Beta napthol is not offering on spot in any quantities, and prices are nominally held in most quarters of the market. Dimethylaniline was easier in spots during the past fortnight, but has firmed up since and is held at about $1.30 per pound.

Current Prices for Chemicals, Fillers, Colors, etc.

Acetone, carlots	lb.	.21 @	.22
smaller lots	lb.	.22 @	.23
Acetanilid, C. P., bbls.	lb.	.70 @	.80
Acids, Acetic, 56 per ct.	cwt.	8.40 @	9.15
Carbolic, C. P.	lb.	.12 @	.20
Muriatic, 20 deg.	cwt.	2.25 @	2.50
Muriatic, 22 deg.	cwt.	3.00 @	3.25
Nitric, 42 deg.	cwt.	7.50 @	8.00
Nitric, 40 deg.	cwt.	7.50 @	7.75
Sulphuric, 60 deg. car lots	tons	19.00 @	21.00
Sulphuric, 60 deg. car boys		19.00 @	21.00
Tartaric, crystals	lb.	.76½ @	.77
Aluminum, Silicate		Nominal	

Aniline oil, bulk basis, Contract	—	@	—
Imported	Nominal		
Domestic	.33	@	.35
Antimony—			
Oxide lb.	.14	@	.15
Sulphuret, red lb.	.22	@	.25
Sulphuret, golden lb.	.29	@	.30
Sulphuret, crimson lb.	.45	@	.50
Alcohol, denatured, 190 proof	1.08	@	1.12
Wood, 95 per cent	3.25	@	3.30
Ethyl, 190 proof	Nominal		
Aldehyde Ammonia	Nominal		
Ammonia, powdered	.17	@	.17½
Ammonium Carbonate, domestic lb.	.16	@	.16½
Amyl Acetate gal.	4.70	@	4.80
Anthracene, 80 per cent	1.00	@	1.10
Anthroquinine, 95 per ct.	4.00	@	4.25
Asbestine	Nominal		
Asphaltum, Egyptian lb.	.20	@	.25
Domestic ton	.30	@	.40
Barium, dust	—	@	—
Sulphide lb.	.07¼	@	.07½
Barytes, prime white imported ton	Nominal		
white, domestic ton	Nominal		
off-color, domestic lb.	Nominal		
Southern, f. o. b. mills	23.50	@	25.00
Western, f.o.b. mills	23.50	@	25.00
Beeswax	.28	@	.65
Benzidine Base lb.	1.35	@	1.40
Benzol, 90 per ct. gal.	.28	@	.30
Benzol, pure bulk, 100	.30	@	.35
Blanc Fixe, dry, bbls. lb.	.05½	@	—
Benzidine, 90 per ct. gal.	1.35	@	1.40
Burgundy Pitch, dom. lb.	.08	@	.10
Foreign	.60	@	.65
Blacks, Drop lb.	.05½	@	.15
Ivory lb.	.16	@	.30
Carbon, gas, cases lb.	.15	@	.30
Lampblack R M lb.	.15	@	.45
Mineral blacks ton	35.00	@	45.00
Blues, Prussian	.98	@	1.00
Soluble lb.	1.05	@	1.10
Ultramarine lb.	.15	@	.50
Browns,			
Umber, Turkey, burnt powdered lb.	.05½	@	.07
American, burnt lb.	.04½	@	.06
Cadmium, sulphide, yellow lb.	1.50	@	1.65
Carbon Disulphide, bulk lb.	—	@	—
Bisulphide lb.	.07½	@	.08
Casein, C. P. lb.	.35	@	.36
Castor Oil	.19	@	.22
Caustic Soda, 76 per ct.cwt.	6.50	@	6.75
Chalk, precipitated, extra light lb.	.05½	@	.06
heavy	.04½	@	.05
China clay, domestic ton	9.00	@	20.00
imported ton	19.00	@	24.00
China Wood Oil, bbls. lb.	.22	@	—
F.o.b. Pacific Coast	.18½	@	—
Chloroform, U. S. P.	.40	@	.45
Coal Tar Pitch	—	@	—
Cottonseed Oil, crude f.o.b. mills lb.	15.25	@	15.50
Prime summer yellow bbls.	18.50	@	—
Dimethylaniline lb.	1.85	@	1.90
Elateron	—	@	—
Formaldehyde, spot lb.	.50	@	.53
Fullers Earth, powd., 100 lbs.	1.50	@	2.00
Fossil flour lb.	.03¾	@	.05
Genasco Mineral Rubber	—	@	—
Gilsonite ton	55.00	@	65.00
Glue, extra white lb.	.35	@	.45
medium lb.	.30	@	.35
low grade	.20	@	.25
foot stock	.17	@	.21
brown foots	.17	@	.21
common bone	.16	@	.20
Glycerine, C. P. (drums) lb.	.28	@	.28½
cans	.29	@	.30
Graphite, flake (bbl.) lb.	.14	@	.20
powdered (bbl.) lb.	.05	@	.10
Green, chrome, R. M. lb.	.42	@	.70
Ground glass (fine) lb.	.03½	@	.04
Hexamethylene lb.	Nominal		
Infusorial earth, powd'd. lb.	.02	@	.035
bolted lb.	.035	@	—
Iron oxide, red, reduced grades lb.	.13	@	.15
red, pure, bright lb.	—	@	—
Hexamethyenetetramine lb.	Nominal		
Kaolin	—	@	—
Lime, hydrated	—	@	—
Lead, red, dry (casks) lb.	.12¼	@	.12½
sublimed lb.	—	@	—
white, basic carb. lb.	.10½	@	.11
white, basic sulp. lb.	.10	@	.10¼
Lime flour lb.	.01¾	@	.02
Litharge (casks) lb.	.11¾	@	.12¼
English lb.	—	@	—
Lithopone, domestic, bbls. lbs	.08	@	.08¼
in bags lb.	.07¾	@	—
M. R. X.	—	@	—
Magnesia, carbonate lb.	.17	@	.21
calcined light lb.	.60	@	.65
Magnesite, calcined, pwd. ton	50.00	@	65.00
Magnesia Oxide, heavy	—	@	—
Light	—	@	—
Extra light	—	@	—
Napthalene lb.	.15	@	.17
Nirobenzol	.14½	@	.16
Naphtha, motor gasoline, (steel bbls.) gal.	.28½	@	—
68 @ 70 degrees (steel bbls.) gal.	.35½	@	—
70 @ 72 degrees (steel bbls.) gal.	.36½	@	—
73 @ 76 degrees (steel bbls.) gal.	.38½	@	—
machine (steel bbls.) gal.	.47½	@	—
Oil corn, crude factory cwt.	16.06	@	—
corn, ref. bbls.) cwt.	20.56	@	—
linseed, (bbls.)	1.63	@	—
In carloads, spot	1.60	@	—
tank cars	1.53	@	—
Oil palm, Lagos lb.	.11	@	.11½
Niger	.10½	@	.10¾
pine, yellow gal.	1.00	@	—
distilled gal.	1.25	@	1.35
rapseed, refined gal.	1.60	@	1.65
rapseed, blown gal.	1.75	@	—
rosin first rectified, gal.	.71	@	—
second run	.74	@	—
tar (commercial) gal.	.38	@	.40
Oleum Acid, 20 per ct. ton	29.00	@	35.00
Orange mineral, Amer. lb.	.15½	@	.16½
imported lb.	Nominal		
Ozokerite	.35	@	.36
Paraphenylenediamine lb.	2.70	@	2.85
Petrolatum, bbls., amber lb.	.06	@	.07
pale yellow lb.	.06½	@	.07
Paranitrosodimethylanaline	3.50	@	4.00
Parafin, refined, 118 @ 120 m. p.	.12	@	—
127 @ 129 m. p.	.11	@	—
137 @ 140 m. p.	.12½	@	—
Phenol	.12	@	.25
Pumis	.05	@	.10
Pine tar kiln bbl.	14.50	@	—
Pitch bbl.	8.50	@	—
Plaster of paris bbl.	4.25	@	5.00
Red Tuscan lb.	.22	@	.30
red (American) lb.	.14	@	.16
Indian (English) lb.	.14	@	.16
Standard lb.	—	@	—
Rosin (common to good)— 280 lbs.	13.50	@	—
Rotten stone, powdered lb.	.02½	@	.04½
Rubber, substitute, black lb.	.13	@	.17
white lb.	.15	@	.24
brown lb.	.20	@	.25
Rosin Oil, first rectified	.71	@	—
Second rectified	.74	@	—
Third rectified	.91	@	—
Fourth rectified	.95	@	—
Soda ash, light, 58 pct. cwt.	3.60	@	3.75
Sodium Nitrite lb.	.24	@	—
Solvent Naptha, crude, hvy.	.25	@	.32
Soya Bean Oil, bbls. lb.	.17	@	—
Sellers, tanks, f. o. b. Coast	.12	@	—
Stearic Acid, single	.22¾	@	—
Shellac, fine orange lb.	Nominal		
Sulphur Chloride, drums	.06½	@	.16
T. N. lb.	1.10	@	1.15
Bleached ordinary lb.	1.05	@	1.10
Bleached, bonedry lb.	1.20	@	1.30
Silex (silicia) ton	25.00	@	40.00
Soapstone, powdered ton	15.00	@	20.00
Starch, corn, powd. cwt.	5.62	@	—
pearl	5.47	@	—
Jap potato, duty pd, lb.	.05	@	.05½
Sulphur, crude ton	—	@	—
100 pounds	—	@	—
roll	3.20	@	—
commercial superfine	2.00	@	2.25
Talc, American ton	18.00	@	20.00
French ton	30.00	@	—
Thiocarbanilid	—	@	—
Toluol, pure, in drums gal.	.31	@	.35
commercial	.30	@	.32
Tripolite earth lb.	.01½	@	—
Turpentine, pure gum— spirit gal.	2.52½	@	—
wood gal.	—	@	—
Venice, artificial gal.	.15	@	.16
true	Nominal		
Vermilion, English	1.70	@	1.75
American	.25	@	.30
Vorite	Nominal		
Wax, beeswax, crude yel. lb.	.27	@	.29
refined	.34	@	.36
Bayberry	.37	@	.39
ceresin, white lb.	.15	@	.16
yellow	.14	@	.15
Whiting, commercial cwt.	1.40	@	—
Gilders Bolted	1.55	@	—
Paris white, Amer. cwt.	1.75	@	—
English cliffstone cwt.	2.00	@	—
Xylol (gal.) pure	.40	@	.45
Commercial	.33	@	.37
Zinc Oxide, French process, red seal	.11½	@	.11¾
green seal	.12½	@	.12¾
white seal	.13½	@	.13¾
Leaded Grades—			
Commercial, lead free	.09½	@	.10
5 per ct. lead sulphate	.09	@	.09¼
10 per ct. lead sulphate	.08¾	@	.09¼
20 per ct. lead sulphate	.08½	@	.09
35 per ct. lead sulphate	.08¼	@	.09¼
Zinc sulphate	.03½	@	.04¼

Crude Rubber

JULY 6, 1920.

Covering by short interests has been the main feature of the market during the last two weeks, but this volume has not been sufficiently important to stay the downward trend of prices. Buyers are not in the market for spot stocks to any extent, and no amount of price cutting by importers will bring the demand up to the point where the market might be called active. Importers realize this, and therefore are holding the market as steady as possible. Rubber manufacturers are not buying in the local market, and according to reports have been offering for sale consignments which have been coming forward to them from primary markets on contracts.

The price trend has been decidedly downward during the past fortnight, as the appended table will show:

	Cents per Pound.		
Para—Up-river fine	.36	@	.37
Up-river medium	.33½	@	34
Up-river coarse	.26½	@	.27¼
Caucho ball	.27½	@	.28½
Islands fine	.36	@	.37½
Islands coarse	—	@	—
Cameta	.21	@	.21½
Ceylon—Smoked sheets, ribbed	.36	@	.37
Smoked sheets, plain	.34	@	.35
Maderia, fine	.43	@	.44
Knapsack	.45	@	—
First latex pale crepe	.36½	@	.37½
Amber crepe	.34	@	.37
Clean brown crepe	—	@	—
Rio Nunez string	—	@	—
Palembang	13	@	.13½
African	Nominal		
Prime Surinam sheets	.84	@	—
Centrals—Corinto prime	.26	@	.27
Esmeralda, prime	.25½	@	.26
*Balata, sheets	—	@	—
Guayule, wet	.27	@	.28
Balata, block, Panama	.45	@	—

*Nominal.

Scrap Rubber

JULY 6, 1920.

Reclaimers are not buying in the present market, and spot holders are overloaded. Dealers do not look for any pronounced activity in the market until early winter, when reclaimers begin to lay in stocks, but it is expected that buying will be seriously interfered with if the market for the crude stock remains at its present low levels.

Boots and shoes are weaker at 6.87½ to 7.25 cents per pound, with trimmed arctics lower at 5.87½ to 6.00 cents per pound. Auto tires are also lower, being offered at 2.75 to 3.00 cents, with bicycle tires held at 1.90 to 2.00 cents. No air-brake is on the market. Mixed hose is quoted down to 1.37½ to 1.50 being the outside price in most instances. No. 1 inner tubes are held at 13.00 to 14.00 cents, with No. 2s nominally held at 7.90 to 8.25 cents per pound.

	Cents per Pound.		
Boots and shoes	6.87½	@	7.25
Arctics, trimmed	5.87½	@	6.00
Arctics, untrimmed	5.00	@	—
Tires—Automobile	2.75	@	3.00
Bicycles, puenmatic	1.90	@	2.00
Mixed hose	1.37½	@	1.50
Air brake	—	@	—
Inner tubes, No. 1	13.00	@	14.00
Inner tubes, No. 2	7.90	@	8.25
Red tubes	7.50	@	7.75

Cotton Conditions Improve

Statistics for June Show Gain in Percentage Condition over Preceeding Month—Weather Improves Materially in Many Sections of Cotton Belt—Labor Scarce and Unreliable

The Journal of Commerce and Commercial Bulletin, of New York, recently published the following account relative to cotton conditions:

From reports of nearly 1,800 special correspondents, received on an average date of Jue 25, it will be seen that the percentage condition of cotton during the month of June has gained 3.5 per cent and is now estimated at 71.5 per cent. While this figure is still far below the ten year average of 79.1 per cent, it compares very favorably with last month's condition report of 68.0 per cent and is even slightly better than a year ago, when it stood at 71.4 per cent. In 1918 the per cent condition was much higher, 83.1 per cent, but the year before that it was reported at 71.7 per cent. The above returns are the more encouraging since they follow upon two exceedingly unfavorable reports earlier in the year, when the excessive rains and unseasonably low temperatures of April and May had resulted in not only a sharp reduction in acreage, but also in bringing down percentage condition to the lowest level in thirteen years. The estimated yield in bales for this year, according to the Government's method of calculation, based on an acreage of 35,133,000 will be 11,745,300 bales. This contrasts with an actual production of 11,329,755 bales in 1919, 12,040,532 the year previous and 16,143,930 in the banner year of 1914.

Noticeable Gains

The most pronounced gains have taken place in Missouri with a condition of 75.0, against 65.0 last month; Alabama, 67.6, against 61.6, and Arkansas 74.1 against 69.6. Texas advanced 4.0 per cent to 72.5 per cent. Louisiana 3.5 per cent to 75.5 per cent and North Carolina 3.6 to 73.9 per cent. Oklahoma indicated the highest per cent condition, namely, 76.1 per cent, though this is a gain of only 2.1 per cent from last month. Florida made the poorest showing of all, having fallen to 56.0, a decline of more than 16 per cent.

Nearly all of the improvement above noted has taken place during the past two weeks with the needed succeession of warm, sunny days. Fields which had been badly in the grass are now rapidly being cleaned up and in a majority of cases the crop, though late, is said to be making good progress. In Texas good rains have fallen over wide sections where drouth had prevailed, while hot, dry weather has been had elsewhere. Probably the greatest improvement in climatic conditions has taken place in the Carolinas and Alabama, where cotton is said to be doing finely. Georgia though still somewhat backward, is gaining ground. Arkansas and Tennessee also promise well, but Mississippi and Oklahoma are still suffering from an overabundance of rain. In Louisiana some improvement is recorded, but the weather continues showery and weevils are working sad havoc in the infested regions. The outlook for Florida is discouraging. There early heavy rains have been followed by a protracted dry spell, with the result that growth has been seriously retarded. Weevils are very numerous and cultivation owing to the labor situation is poor.

Taken as a whole, however, the report is more favorable than has been looked for, although it must not be forgotten that practicaly everywhere the plant is very small, that labor is scarce and high and exceedingly inefficient and that the prospects are for more than usually serious inroads from the boll weevil and other like pests owing to the extremely moist condition of the soil. To this should be added the fact that cotton has still to face the two most critical growing months of the year—July and August—when deterioration is often most severe. Under these circumstances the consensus of opinion among an overwhelming majority of expert crop observers is that nothing short of practically ideal weather for the next month or six weeks will be able to overcome the difficulties above enumerated and insure the production of an average crop.

Percentage condition by States is shown in the accompanying table:

	1920			July	
	July.	June.	Diff.	1919.	1918.
S. Carolina..	74.0	71.2	+ 2.8	77.2	84.0
N. Carolina..	73.9	70.3	+ 3.6	79.3	86.3
Georgia	65.9	63.8	+ 2.1	74.3	80.6
Florida	56.0	72.5	—16.5	69.0	76.0
Alabama	67.6	61.6	+ 6.0	68.3	82.6
Mississippi ..	69.9	67.7	+ 2.2	66.3	82.7
Louisiana ...	75.5	72.0	+ 3.5	67.2	83.5
Texas	72.5	68.5	+ 4.0	71.6	81.6
Arkansas ...	74.1	69.6	+ 4.5	67.5	86.5
Tennessee ...	72.4	68.5	+ 3.9	65.8	91.6
Missouri	75.0	65.0	+10.0	65.0	83.3
Oklahoma ...	76.1	74.0	+ 2.1	72.0	87.1
Average ..	71.5	68.0	+ 3.5	71.4	83.1

Acreage Yield and Condition

Government estimates of acreage and yield, together with the percentage condition for June during the past ten years, are given below for comparison:

	Bales.	Acreage Planted.	Condition.
1920	.....	35,133,000	71.5
1919	11,329,755	35,133,000	71.4
1918	12,040,532	37,073,000	83.1
1917	11,302,375	34,925,000	71.7
1916	11,449,930	35,994,000	78.6
1915	11,191,820	32,107,000	79.7
1914	16,134,930	37,406,000	78.6
1913	14,156,486	37,458,000	80.9
1912	13,703,421	34,776,000	81.3
1911	15,692,701	36,681,000	85.9

Increases or Declines During June

The June and July reports for the past ten years, together with the increase or declines during June, are given in the following table:

	1920.	1919.	1918.	1917.	1916
July	71.5	71.4	83.1	71.7	78.6
June	68.0	78.5	81.2	74.0	79.1
	+3.5	—7.1	+1.9	—2.3	—0.5
	1915.	1914.	1913.	1812.	1911.
July	79.7	78.6	80.9	81.3	85.9
June	80.4	78.2	80.5	76.9	83.8
	—0.7	+0.4	+0.4	+4.4	+2.1

Higher Chemical Prices Predicted

A Daigger & Company, of Chicago, Ill., have issued a bulletin commenting on the price outlook for chemicals and rubber compounding materials. The bulletin is as follows:

It is our opinion that the factors affecting prices of chemicals and rubber compounding materials have at this time a decidedly opposite tendency to those affecting prices of wearing apparel, luxuries, novelties and other items which are now undergoing price deflation. The later have been very largely over-produced, whereas the entire list of industrial chemicals is in a condition of very serious under-production.

This condition is aggravated by the long continued railroad tie-up and to some extent by the shortage of trucking facilities in the New York harbor and warehousing sections. Crude materials arriving from foreign sources cannot be properly distributed owing to these conditions. This situation in addition to the general labor shortage has restricted production and distribution of the items of primary importance to the rubber trade. We are all familiar with the shortage of tale, china clay, colors, carbon bisulphide, acetone, antimony, hexamethylenetetramine, etc.

We feel that the present restriction of bank credits will have only a temporary retarding effect on chemical prices. The law of supply and demand will very shortly assert itself and we forsee a period of much higher prices than we have met with in the immediate past.

Rubber Prices from 1914

An interesting compilation of the wholesale prices of seventeen commodities of an essential character appeared in the July issue of The Commerce Monthly, published by the National Bank of Commerce in New York. The figures given show the wholesale prices of the articles in question from January 1914 to the present time and are given at quarterly intervals throughout each year. Prices of Plantation, first latex crepe, New York, and Para, upriver fine, New York, are given as follows:

PLANTATION, FIRST LATEX CREPE, NEW YORK

	Jan.	April	July	Oct.
1914	.56	.63	.55½	.61
1915	.86	.62	.63	.59½
1916	.92	.82	.58	.61½
1917	.80	.80½	.67	.63½
1918	.57	.60	.63	.59
1919	.55	.49½	.40	.51

	Jan.	Feb.	Mar.	Apr.	May	June
1920	.53½	.48	.48½	.45	.38	.38

PARA, UPRIVER FINE, NEW YORK

	Jan.	April	July	Oct.
1914	.73	.74	.68½	.63
1915	.75	.58	.63	.54½
1916	.86	.75	.66	.74
1917	.77½	.76½	.68½	.64
1918	.58	.61	.68	.63
1919	.60	.55	.55	.53

	Jan.	Feb.	Mar.	Apr.	May	June
1920	.49	.45½	.42	.42	.39½	.37½

McLean Promotes O'Connor

J. O'Connor, for the past year with the McLean Tire & Rubber Company, East Liverpool, Ohio, has been appointed general sales manager in the New England states at 119 Chandler St., Boston, Mass. under the name of McLean Tire & Rubber Co. of New England.